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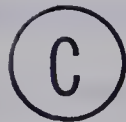
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THE UNIVERSITY OF ALBERTA

THE NATURE AND SIGNIFICANCE OF THE  
THEORY OF THE URBAN ECONOMIC BASE

by



RICHARD L. SHAFFNER

A THESIS

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## ABSTRACT

One of the fundamental problems confronting economists is solving the mystery of economic growth. The economic base technique claims to offer a practical approach for obtaining a solution for urban areas. Since the mid-1950's, however, the economic base technique has been the subject of considerable criticism and its popularity among urban planners has declined.

Without dealing to any extent with the empirical implications involved, this thesis examines the economic theory which explains the base concept. It tries to demonstrate how the concept is consistent with certain other growth models in an effort to determine the validity of the results it would yield when employed. In this way, it is shown that many of the criticisms against the economic base are unjustified and it merits reconsideration as a planning technique.



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## CHAPTER I

### INTRODUCTION

In recent years there has been a growing confidence among economists that their analytical tools are capable of inducing the Western economies on a national scale toward certain desirable goals. Economists are rapidly extending their range of study beyond the traditional fields into areas that are seemingly of less overall importance but yet present challenging economic problems. Urban economics is a forerunner among these newly emphasized fields of study. Interest has been generated here by the rapid increase in the urban population relative to that of non-urban areas and the various problems associated with this increase. While urban analysts attempt to solve a wide range of relevant problems, conceptually the most fundamental inquiries are concerned with the urban growth process itself. The theory of the economic base, being primarily involved with predicting the growth of an urban unit, is one of these. The overall purpose of this thesis is to explain and assess the economic base concept as it has been developed for analyzing the urban economy. When we speak of "growth" we refer to increases in the total population of a community resulting from increases in total employment or total income there.

Originally the concept was adopted by urban planners to satisfy



the need for an explanation of growth. Economists have subjected it to rigorous investigation in efforts to determine its value as a device for comprehending the process of growth. Wilbur R. Thompson suggests that "Only by understanding the local growth process can local government hope to even partially master its own destiny."<sup>1</sup> The strength of the economic base and its estimated expansion are of major importance in decisions of local government with respect to the expansion of community facilities, the development of land planning programs, and the selecting of specific portions of cities that may require special attention. Similarly, business decisions are affected by the impact of growth or decline of the city.

The growth and prosperity of an urban unit depends largely on its advantages in attracting income from beyond its borders. Urban economic activity may be divided into either production for export or production for local consumption. The export industries carry the responsibility of bringing income into the urban unit from outside and are referred to as "basic" activities, as opposed to the "nonbasic", "non-exporting" or "service" activities which comprise the rest of the urban unit. The theory, in its simplest form, states that growth in urban employment or income and population levels for a specific change in basic industry, will depend on the ratio between the basic and non-

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<sup>1</sup> Wilbur R. Thompson, A Preface to Urban Economics, Resources for the Future, Inc. (Baltimore: The John Hopkins Press, 1965), 2.



basic sectors of the economy. It will not be the concern of this study to consider the added problem of why a base of a certain industrial composition arises in an area in the first place.

Planners have found the economic base concept an attractive predictive technique; but, to the critical eye of the economist, it is too simple. Too many significant variables are not incorporated into the concept. Simplicity is becoming more and more an attribute of declining importance as the desire for more accurate results favor "analytical approaches capable of a higher ultimate level of performance".<sup>2</sup> Input-output and linear programming, as alternative planning techniques, in recent years have attracted much attention away from the theory of the economic base. It is my opinion that the hasty desertion of the latter by economists is largely unjustified and that by building on the income approach of the economic base, a much more substantial growth theory than is evident in the simple base model can be uncovered. An effort will be made to show the economic theory implied by the economic base concept but not explicitly understood by planners nor adequately explained by economists.

Initially, an examination of the simple base technique of planning is undertaken to provide a framework on which the more sophisticated ideas to be presented later can be based. Multiplier

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<sup>2</sup> John C. Murdock, "Homer Hoyt and the Dilemma of Urban Economic Base Analysis", Land Economics, XXXVIII (February 1962), 66-70.





analysis, an integral part of the base concept, represents a preliminary attempt by economists to adopt their accepted economic theories and analytical tools to the urban economy. Throughout this thesis, attempts are made to employ other such tools of analysis in conjunction with the economic base theory to derive a more economically solid planning technique than the simple approach provides.

Basically, the paper will be devoted to a clarification of the income approach to the economic base theory. It will be shown that the economic base can be expressed in terminology of the form of national accounting procedure. This aids in explaining how exports contribute to the growth of an urban area. An attempt is also made to isolate the internal forces affecting the income multiplier.

Elaborating further, it will be shown that there must be a consistency between the net exporting position of an urban area and the flows of capital in that community's accounts. This explicitly introduces the concept of investment which becomes vital to a full understanding of the economic base. To clarify this, well-known dynamic growth models are examined and their consistency with the economic base income approach is found to provide interesting theoretical and policy implications. By trying to demonstrate that features of the urban economy are analogous to national income analysis and that the base theory is consistent with widely accepted conventional theories of growth, it is hoped that the true economic significance of the base theory will be revealed and that a fuller understanding of its usefulness as an approach to predicting urban growth will be achieved.





## CHAPTER II

### THE ELEMENTS OF THE ECONOMIC BASE THEORY

The development of the economic base technique for practical application by planners has involved surmounting various obstacles. This chapter proposes to deal with these areas of difficulty and thereby to present a picture of what the economic base concept in its simplest form consists. In particular, three problems are encountered: demarcation of a specific area suitable for study, selection of an adequate and convenient unit of measurement of basic and nonbasic activities, and identification of activities according to classifications of basic or nonbasic. It is anticipated that by initially undertaking a presentation of the simple base approach, the foundation that is needed for a clearer understanding of the more complicated theory to follow is erected.

#### Delimitation of the Base Area

As a first step in analyzing the economic base theory, the problem of identification of a suitable urban area for study should be considered. There should be established a precise geographic division between the producing economy and the beginnings of its export market. Because most economic base studies have dealt with a specific community, the problem of delimitation of the area has only infrequent-



ly been considered in the literature.

The simplest approach for deciding upon the size of an urban unit is to use the political boundaries designated by incorporation. This arrangement is justified only in those cases when the appropriate economic activities are completely contained within those legal boundaries. Another legally defined area that may be used is the county. In the case where a large percentage of the population is contained in one urban area in that county, it is quite acceptable.<sup>1</sup> When county and town data is readily available as it is in the United States, avoidance to some degree of expensive data collection processes by planners is possible. This procedure may be used as an expedient if there are not time or adequate funds available to make possible independent collection of data for an area other than that within specified political bounds. Large cities frequently consist of portions of a number of counties and the area for base study purposes can be taken to consist of those counties in their entirety.

In such situations, the metropolitan concept of base area delimitation has become popular. The United States, a leader in this respect, has 231 definite Standard Metropolitan Statistical Areas<sup>2</sup>

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<sup>1</sup> An example of this is the study of Stark County, Ohio. Stark County Regional Planning Commission, Economic Base Study Planning Dimension, (Canton, Ohio: Stark County Regional Planning Commission, 1960).

<sup>2</sup> As of July 1, 1967. U.S. Bureau of the Census, Statistical Abstract of the United States 1967, (Washington, D.C: 1967).



(before 1960 called Standard Metropolitan Areas) which are defined by specific conditions based on the principle that "an area should be an integrated economic and social entity, with an attendant large volume of daily travel and communication between the central city and the outlying parts of the area".<sup>3</sup> Standard Metropolitan Statistical Areas are characterized by at least one city of 50,000. If two or more cities of populations totalling over 50,000 are within twenty miles of each other, they are included in the same SMSA. The county in which the city of 50,000 or more is located is in the SMSA. Contiguous counties are included also if certain designated conditions hold.<sup>4</sup> Inclusion of whole counties by SMSA definitions into metropolitan areas makes for accounting for territory that is not metropolitan. In these instances the population of such a territory is too small to be of real significance. The major weakness of the metropolitan area approach to base delimitation is that its structure does not accommodate considerations of towns and cities smaller than the population minimums it sets

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<sup>3</sup> U.S. Bureau of the Census, Census of Population, 1950.

<sup>4</sup> For a complete definition of SMSA's in the United States see U.S. Bureau of the Census, U.S. Census of Population: 1960. Vol. I. Part 1. xxxi-xxxii.

In Canada, the concept of a Census Metropolitan Area is used. In 1961, CMA's were defined to consist of an incorporated city of at least 50,000 persons and a surrounding area large enough so that the whole Metropolitan Area contained nearly 100,000 or more persons. The part of the CMA surrounding the central city should have at least 70% of its labor force engaged in non-agricultural activities, and a minimum population density of 1,000 persons per square mile in its built-up segments. (Dominion Bureau of Statistics, Census of Canada, 1961).





out, although conceptually this could be done.

Prior to the use of SMSA's in the United States, one type of base area delineation was in terms of industrial areas consisting of groups of adjoining counties containing large proportions of manufacturing wage earners.<sup>5</sup> The principal limitation of the industrial area approach was that it dealt with the manufacturing labor force only and thus was not generally applicable to all base phenomena.

Base areas prior to 1950 were also defined by labor market area criteria. Within such an area, workers could change jobs without changing their residence. A labor market area was limited by the distance people were willing to commute to get to work, especially by local transportation facilities. It did not necessarily consist of complete counties. This approach was attractive in that it could be applied to all types of communities regardless of size and to all types of activities. A disadvantage of using such finer geographic distinctions as boundaries was that they might change with variations in the growth pattern, the commuting area expanding beyond the base area in prosperity and contracting well within it in depression. Although the county was a cruder device for delimitation, it could better absorb national, regional, and local fluctuations in growth.

These are the major approaches in urban base area demarcation.

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<sup>5</sup> An example of an industrial area study is Frank L. Kidner and Philip Neff, An Economic Survey of the Los Angeles Area (Los Angeles: The Hayes Foundation, 1945).





Fundamentally, a base area is an economic unit involved in the producing and distributing of goods, services, and capital both as basic and as nonbasic activities. The outer limits may be defined in a rough manner by the extent of the interdependence between the basic and non-exporting industries. The principal factors of production for both sectors should be within the particular geographic area of the study.

### Measuring the Economic Base

The problem of identifying the base activities of an urban area for planning purposes is handled by measuring the community's activities so that comparisons among them can be made. The most important of the units of measurement appearing in the literature will now be assessed. In addition to helping provide a means of identifying the economic base of a community, measuring activities is a way to weight their importance to the local economy. To some extent the weaknesses that are inherent in the various units of measurement can be countered by using more than one type of measure for any given activity.

Because employment data from census bureaus is readily available, it has been the most widely used single measurement unit in economic base studies. Its strength is encompassed in the universal character of a job. The number of jobs in an area is highly correlated with the number of family units and with the migration of people into and out of a region. An obvious weakness of employment figures, however, is its inability to evaluate flows of capital both into and



out of the community. These capital movements have considerable influence on the growth pattern of an urban area and failure to account for them introduces a sizable error into the analysis.

Because output per worker varies greatly from one job to another, the number of jobs an industry provides for a certain level of physical product will vary. This inaccuracy is evident when exports are increased through greater productivity which is reflected in higher incomes but does not affect the employment levels of the industries. Sometimes the employment data used includes part-time and seasonal employment, causing inaccuracies in terms of actual employment levels. These can be eliminated by converting the hours worked by the part-time and seasonal employees into the equivalent number of jobs of full-time employment. Similarly, account can be taken for overtime work.

The preceding paragraph intimated that income may be used as a unit of measurement of community activities. It is, theoretically at least, the most important unit and as such merits more detailed analysis.<sup>1</sup> Because some industries require more highly skilled labor than others, the relative importance of base industries where payrolls are used as a unit of measure will not necessarily correspond to that where employment is used. To mediate this it may be possible to ascertain the number of jobs in each industry at a certain income level. Each

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<sup>1</sup> Charles M. Tiebout, "The Urban Base Reconsidered", Land Economics, XXXII (April 1956), 95-99.



\$30,000 job could be considered equivalent to three jobs of \$10,000 income. On the other hand, this will have distorting implications for the community with respect to the economic opportunities that a number of jobs opens up. A greater concentration of higher incomes indicates a higher propensity to save and a lower propensity to consume, especially locally produced goods and services.<sup>2</sup>

Another problem arising from using incomes is that they are subject to price changes. Over time the influence of inflationary or deflationary pressure makes it necessary that payroll data be adjusted upwards or downwards in order to be comparable to a base year. In many cases there will be no individual retail price available for the area under consideration so that the adjustment data must be borrowed from some neighboring area which may not be comparable economically with the one under consideration. The advantages of an accurate price adjustment are succinctly evaluated by Andrews:

. . . if a generally reliable adjustment can be made it will show at least two important facts concerning the urban economy under analysis. On the one hand the adjustment will show the change, positive or negative, in the total payroll weight of the basic enterprises. There is a type of change, which, as indicated earlier, could take place without change in total community employment. The other application of the adjustment process is similar to the first. In this instance price adjustment is used more in a qualitative sense to show the

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<sup>2</sup> Richard B. Andrews, "Mechanics of the Urban Economic Base: The Problem of Base Measurement", Land Economics, XXX (February 1954), 55.





net change from the base year of particular basic enterprises that go to make up the community table.<sup>3</sup>

In considering how the economic base of a city changes over time as measured by incomes, stability of the payroll data is a prime consideration. Misleading variations may arise from such irregularities as strikes or, at the other extreme, an unusual amount of overtime. Although these may be obvious to those who do the base study, it is difficult to know how to adjust for them. Changes in the industrial composition of the community would also create problems; but, this is a difficulty associated with the nature of the base which this thesis tries to avoid being concerned about.

To this point, we have been using the term "income" to be synonymous with payrolls. This is a convenient simplification because payrolls are a sufficiently vital component of income as to merit special attention, but it is hardly an accurate assumption. Community income or expenditure flows, following from the national accounting framework, includes wages, salaries, rents, interest and profits or the sum of consumption, saving, government expenditures and the difference of exports less imports. These calculations of money flows provide the most inclusive single unit of measurement. Community income and expenditure flows include consideration of capital exports that cannot adequately be expressed by other measurement units. The community flows

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3 Ibid.





approach involves securing such an immense amount of detailed data, especially as cities get larger, that its analytical value may seem to be overwhelmed by its conceptual complexity. The purpose of much of the thesis is a clearer expression of this income form of the economic base theory.

It was cited above that employment failed to account for variations in physical production between industries. Yet neither is calculation of physical production alone adequate as a unit of measurement for identification of base activities, because it is totally useless in accounting for non-physical output. Andrews claims it is best employed as a weighting device for comparing base activities involved in manufacturing.<sup>4</sup> This is enhanced by its ability to indicate the quantitative importance of technological change which is frequently not evident from employment and payroll data because these are not affected. As a unit of measure then, physical product should be primarily used as a tool for the more accurate evaluation of employment and income data.

Sales by industries in a community may be used as units of measurement by calculating the relative sales of firms to local and to non-local markets. Frequently such data are then converted to another measure such as employment to determine the size of the export base of the economy. Weaknesses inherent in the use of sales figures include the problem of double counting through sales of intermediate goods and

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<sup>4</sup> Ibid., 57.



the complications of price changes which distort relative values of products over time.

Another unit of measurement, value added of manufactures, which incidentally avoids the problem of double counting, measures the sales of a firm less the cost of inputs. Difficulties are encountered when inputs are used which are not easy to evaluate, such as educational and medical facilities which are of intangible value. Thus value added is reduced to an auxiliary measuring device as was physical product.<sup>5</sup>

Although others have been suggested, this is a summary of the most important units of measurement.<sup>6</sup> It should be emphasized that there is no single unit which is most appropriate as a basis for identification of an economic base. An analyst should try to employ as many units as are relevant and for which data can be obtained.

#### Identification of Base Activities

The principal analytical tool of the theory of the economic base is the use of a ratio of the basic to the nonbasic activities of a particular urban unit. Of prime importance, as a consequence, is

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<sup>5</sup> An exception to this is an article by Charles L. Leven, "An Appropriate Unit for Measuring the Urban Economic Base", Land Economics, XXX, (November 1954), 369-71, which advocates use of value added per se as a superior measure.

<sup>6</sup> Homer Hoyt has suggested, for example, that the value of exports may be determined by calculating the value of imports since the two values are equal in the long run. "A Method of Measuring the Value of Imports into an Urban Community", Land Economics, XXXVII (May 1961), 150-161.



the identification of the base industries. Numerous approaches, varying in degree of complexity and resulting dependability, have been proposed. Generally speaking the base activities can be identified either by direct surveys of the local economy involved or by indirect measures which involve manipulation of some available statistical data. Although employment in most cases is used as the unit of measurement in the following analysis, this is because of its convenience as a source of data and because base studies use it more than any other measure, rather than because it is considered superior.

Simplest of the indirect measures is what Tiebout has labelled the assumption approach.<sup>1</sup> The size of various industries in the community is known and an assumption is made that certain industries are basic, for example, manufacturing, and the rest are localized. The ratio of manufacturing employment to total employment then supposedly provides the base-nonbase ratio. The attractiveness of this approach is its simplicity, but this characteristic also increases the possibility of large errors which minimizes its effectiveness. In his early economic base studies, Homer Hoyt's use of a 1:1 base-nonbase ratio

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<sup>1</sup> Charles M. Tiebout, The Community Economic Base Study, Committee for Economic Development, Supplementary Paper No. 16, (New York: Committee for Economic Development, 1962), 46-47.





was nothing more than a special case of the assumption technique.<sup>2</sup>

Upon realizing that to estimate the ratio in such a way is to assume away what should be one of the important findings of base research, he refined his techniques. Identification of base activities by the assumption approach could conceivably only have a measure of validity in small isolated communities where it was obvious which industries were basic.

A much more sophisticated of the indirect measures of base identification is what Andrews has labelled the macrocosmic method.<sup>3</sup> In essence, this approach makes a comparative employment study of the city with the nation as a whole. This entails the use of a location quotient or an index of local specialization which is a ratio of the percentage employment in each industry locally to the percentage employment in those industries for the entire nation, assuming the country be just self-sufficient for the product of those particular industries. If the ratio is greater than one for an industry, then local production of the product of that industry exceeds the national

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<sup>2</sup> Arthur M. Weimer and Homer Hoyt, Principles of Urban Real Estate (New York: The Ronald Press, 1939), 44-45. In subsequent editions, Hoyt has recognized the advantages of more sophisticated approaches and abandoned the 1:1 ratio idea. See Weimer and Hoyt, Principles of Real Estate, 4th edition (New York: The Ronald Press, 1960), 704-6.

<sup>3</sup> Richard B. Andrews, "Mechanics of the Urban Economic Base: General Problem of Base Identification", Land Economics, XXX (May 1954), 166-168.





average forcing the community to import some of that classification of product while devoting all of local production to service needs.<sup>4</sup>

The same employment data can also be used to show the absolute size and thus relative importance of the base activities by calculating the difference between actual local industry employment and what the local industry employment would be if it corresponded to the national average. This may be referred to as an index of surplus workers.<sup>5</sup> This index provides a more accurate evaluation of the importance of any base industry because its estimation of criticality is in absolute terms. Although a location quotient may be high, its importance will be slight if relatively few workers are employed in that industry.<sup>6</sup>

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<sup>4</sup> J. M. Mattila and W. R. Thompson suggest in "The Measurement of the Economic Base of the Metropolitan Region", Land Economics, XXXI (August 1955), 215-228 that the index of local specialization, unadjusted for the influence of the local economy in the national economy can be expressed as

$$= \frac{\frac{e_i}{e_t}}{\frac{E_i}{E_t}}$$

where  $e_i$  is local industry employment,  $e_t$  is local total employment,  $E_i$  is national industry employment and  $E_t$  is national total employment.

<sup>5</sup> Mattila and Thompson, Ibid., express the index of surplus workers as

$$S = \frac{e_i - e_t}{E_t} E_i$$

<sup>6</sup> Hans Blumenfeld in "The Economic Base of the Metropolis", Journal of the American Institute of Planners, XXI (Fall 1955), 114-132; reprinted in The Techniques of Urban Economic Analysis ed. by Ralph W. Pfouts (West Trenton, New Jersey: Chandler-Davis Publishing Company, 1960), 229-277 discusses the importance of criticality.



Considerable criticism can be levelled against this neat macrocosmic method. One serious problem involves product mix. Even in an industry with an index of local specialization greater than one, a community will be likely to import some of that product because of the variety of brands of any product that are demanded by local consumers. Similarly, even when the location quotient for an industry is less than one, the community will probably be exporting some of that product because the brand or brands produced locally will be demanded in other areas as well. Closely related to this inaccuracy is the failure to classify production of every individual product type separately. Aggregation of broad classes of production as is found in census data make it impossible to determine by indirect means such as these if a producer is selling all his product locally or what amount he is exporting. Because of the assumption of the index of local specialization that exports are production of some classification of goods less national average purchase of those goods, exports of a local industry will generally be larger than indicated by the location quotients. Other difficulties involve variations in tastes in one part of the country from the national average and differences in productivity of communities from a national standard.<sup>7</sup>

Despite these inaccuracies, the macrocosmic approach has the advantage of being an inexpensive process of deriving an export base.

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<sup>7</sup> Tiebout, op. cit., 48.





Because it tends to underestimate export levels, it is particularly suitable for larger cities which generally export a smaller proportion of their local production than smaller cities and which would be more difficult to survey in a more accurate manner.

The minimum requirements technique of base identification, a variation of the location quotient method, was introduced by Ullman and Dacey.<sup>8</sup> The approach involves study of a certain number of cities in population classes to find the percentage employed in each industry. The smallest percentage in a particular industry in any of the cities studied is the minimum requirement and all employment in other communities above this minimum percentage is export activity employment. To avoid exceptional circumstances it is wise not to use the lowest percentage as a minimum but to avoid the bottom five percent. From this framework, it is obvious that the major problem is determining a minimum which will give a realistic level of exports for the communities involved.

Direct measurement methods, sometimes called the firm by firm approach of base identification, are neatly placed under two classifications by Tiebout.<sup>9</sup> One involves direct measurement of commodity and money flows as can be derived from data on the local economy while the

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<sup>8</sup> Edward L. Ullman and Michael F. Dacey, "The Minimum Requirements Approach to the Urban Economic Base", The Regional Science Association Papers and Proceedings, VI (1960), 175-194.

<sup>9</sup> Tiebout, op. cit., 50-55.





other uses surveys of firms and consumers to provide the desired information about the money and commodity flows.

By measuring the flow of goods and services across a community's borders, the amount of its exports can be ascertained. This is done by a study of transportation industry statistics which may be scarce on an intranational basis. By using a dollar flow measure, capital exports which can not be identified by employment and sales units, can be calculated. This has been done for small communities but becomes extremely complex as the size of the city involved increases.

Surveys of firms and consumers in the local economy are carried on by interviews and mail questionnaires. With respect to firms, it is important to set questionnaires in a manner appropriate to the industry being studied. While mail questionnaires are usually quite acceptable for firms, surveys of consumers are most successful if personal interviews are used. For purposes of determining the economic base of a community, this approach unfortunately depends on the "unavoidable process" of estimation by the management of firms to determine the percentage of business that is carried on outside of that community by its enterprises. Consumer surveys will usually be performed in terms of sales measures and firm surveys in sales, money flow or employment measures. All of these can be converted to employment data for convenient evaluation of base and service sectors.



### Problems of Base Identification

Complicating the general process of base identification are several categories of consumers and activities that pose classification problems. Not always can clearly defined areas be used, accurate statistical computations be made, nor clear distinctions about the basic or nonbasic nature of an activity be established.

In many cases, activities may be linked to an industry producing largely for export. It can be argued that firms which supply an export firm should be classified as export firms also because they would not exist if it were not for the export activities. This assertion needs one qualification. If the inputs to a local export firm are sold as part of the export product then the firm producing those inputs is producing an export since only an organizational line exists between the two firms. In this case a firm can be classified as basic even though it is not selling its output to firms outside the local economy. Allowance for such situations must be made when activities are being identified. It is questionable, on the other hand, to what extent inputs or materials for processing by an export firm or inputs for carrying on the processing can be classified as exports by the firm producing these inputs for sale to local export firms. If such linkages are permitted whole chains of local basic activities, including services, will develop and much of the planning accuracy of the economy base concept may be lost. One reason for the increase in the popularity of input-output has been its ability to clarify such industry inter-



dependence. On the other hand, the indirect measurement techniques fail to even recognize the problem while the direct methods only provide an approximate solution to the problem.

By demarcation of a definite area for study, several problems arise. If a part of the labor force employed in the community commutes from outside, there will exist an inaccuracy in the size of the various local industries' outputs as computed by employment or income data of the activities. The local industries' outputs actually are less by the average output per worker times the number of commuters. Further complication to the accuracy of the relative size of base and service activities occurs when commuters spend a portion of their earnings in the city where they work.

Transportation is an example of an activity the basic or non-basic nature of which may be difficult to isolate. Where a system of transport works completely within a single urban unit, it can be clearly classified as a non-exporting industry. When intercity or international transport is involved the implication would seem to be that the system is basic. In many instances, however, such activities provide a proportion of nonbasic activity to the extent that the local community patronizes the transportation systems. The proportion of local patronization in money terms could be converted to employment terms and any local employment in transport by the local community above this level would thus be a measure of the export segment of the transportation industry.





Certain types of consumers are responsible for complication of base identification as well. Particularly obvious are tourists and university students who make purchases that must be regarded as exports, while visiting or temporarily living in the communities where the purchases are made. The main difficulty is determining the extent of purchases by these groups in order to establish the size of the basic and nonbasic sectors in the community. In many urban areas this problem may not be critical, but in university towns and tourist areas it can affect the evaluation of a community to a critical degree. Even when aware of the complication, determination of data which allows for it is largely dependent on estimates by the sellers of goods and services.

These few paragraphs are intended to exemplify the special problems which are encountered in base identification, not to present anything approaching an exhaustive list of the complications. Unless the weaknesses that permeate the neat identification techniques are recognized and accounted for as completely as possible, the determination of an accurate ratio between basic and nonbasic activities is not likely; and without this ratio, the entire concept of the economic base is reduced to a marginal status as a tool of urban analysis and prediction.





## CHAPTER III

### THE EMPLOYMENT MULTIPLIER

The concept of the economic base as a tool of prediction utilizes multiplier analysis. The basic-nonbasic ratio developed in the previous chapter provides the starting point for what amounts to a simplified econometric model with those industries labelled basic providing the independent or exogenous variables and the nonbasic activities considered to be endogenous.<sup>1</sup> By this evaluation the basic-nonbasic ratio is nothing more than a quantitatively descriptive tool which suggests that the economic base concept measures the extent of the economic interdependence between the activities of a particular urban unit and the activities of all other areas. The change in population induced by export industries through the multiplier effect demonstrates how the basic-nonbasic concept provides a significant approach both theoretically and in practice to urban analysis and planning.<sup>2</sup> This chapter deals with the simple employment multiplier which has been widely used by planners who have employed the economic base technique in their urban studies.

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<sup>1</sup> Charles M. Tiebout, "The Urban Economic Base Reconsidered", Land Economics, XXXII (February 1956), 95-99.

<sup>2</sup> This approach was first introduced to urban area study by M. C. Daly, "An Approximation to a Geographical Multiplier", The Economic Journal, L (June - September 1940), 248-58.



The degree of interdependence between a specific urban area and other areas, or to be more precise, the size of the basic-nonbasic ratio, depends largely on the population of the urban unit, its area, and the extent of its growth.<sup>3</sup> For the purposes of the subsequent discussion, it is assumed that the ratio of basic employment (or income) to nonbasic employment (or income) for any level of basic employment (or income) is the basic-nonbasic ratio.

As a city's population grows larger, economies of scale in the production of goods and services which are not present in less populous cities appear. This has a tendency to induce the city to import proportionally less in the long run as its population increases with the result that the basic-nonbasic ratio falls because nonbasic employment increases relative to basic employment. For this reason it may be asserted that the value of the basic-nonbasic ratio is an inverse function of the size of the city's population. Economies of agglomeration also contribute to this growth of self sufficiency both for consumer goods and services and for such things as social, recreational, and cultural activities.

Similarly the basic-nonbasic ratio varies inversely with the size of the area being considered. As its size increases, a community supplies and consumes internally an increasing percentage of its total

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<sup>3</sup> Charles T. Stewart, Jr., "Economic Base Dynamics", Land Economics, XXXV (November 1959), 327-36.





goods and services. It is increasing transport costs as the area of the city grows which eventually limits the validity of this relationship between the basic-nonbasic ratio and the area. Generally, urban size and population change in the same direction almost simultaneously so that any decrease in the base-nonbase ratio will be a function of both.

Until a high level of per capita income and an advanced degree of interurban specialization is attained, it can usually be assumed that the basic-nonbasic ratio increases with economic progress.<sup>4</sup> One effect of economic advance typified by rising per capita incomes is the shift of functions formerly performed in the household to the market economy.<sup>5</sup> This will necessitate an increase in imports in the short run because not all the goods and services will be available from local sources. Another effect involves changes in consumption patterns which are reflected both in changes in local employment and production patterns and in increased quantities of imports. An examination of the

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<sup>4</sup> See Ralph W. Pfouts and Erle T. Curtis, "Limitations of the Economic Base Analysis", Social Forces, XXXVI (May 1958), 309 [reprinted in The Techniques of Urban Economic Analysis, 318-321]; Hans Blumenfeld, "The Economic Base of the Metropolis", Journal of the American Institute of Planners (Fall 1955), 126 [reprinted in The Techniques of Urban Economic Analysis, 254-256]; Homer Hoyt, "Homer Hoyt on Development of the Economic Base Concept", Land Economics, XXX (May 1954), 185.

<sup>5</sup> Although rising per capita incomes may occur as a result of decreases in population in an area, this is an undesirable exception and is ignored so that rising per capita incomes and rising populations or employment levels occur concurrently. This is more completely clarified in Chapter V.





details of consumption function changes as incomes rise proves helpful in demonstrating how the base-nonbase ratio is affected by rising incomes. Historically, the shift from subsistence to specialization and interdependence between urban areas increased the ratio. Continued rises in income with accompanying diversification of purchases of any category of good or service prolong this trend. To avoid possible confusion, it should be reasserted at this point that corresponding growth in size and population of the urban unit is presently being ignored. In addition to diversification of purchases, the proportions of purchases of certain categories of goods and services change as incomes rise. It has been pointed out that less income is spent on manufactured goods and more is devoted to services at higher levels of income.<sup>6</sup>

A shift from predominantly agricultural products to more manufactured goods would cause the size of the base ratio to increase because of the resulting increased specialization of production, but a marked shift to a greater percentage of services would have an uncertain effect on the ratio. To the extent that the service sector replaces functions formerly carried on in the household thereby elevating local employment levels, the base ratio is lowered. On the

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<sup>6</sup> W. J. Baumol discusses some of the implications of such a shift with particular emphasis on the urban problems emerging from it. [ "Macroeconomics in Unbalanced Growth: The Anatomy of Urban Crisis", American Economic Review, LVII (June 1967), 415-426.]



other hand, the portion of the service sector devoted to transportation, insurance, finance and other means of facilitating and complementing production is largely of a basic nature and would be likely to raise the base-nonbase ratio. A third type of service sector increase involves such things as use of professional services, recreation and travel, and higher education which, for a variety of reasons, may affect the base ratio either way. Thus it would seem that up to the point of the growing importance of services relative to manufactured goods, rising incomes are accompanied by a rising base ratio and after that rising incomes promote a declining base ratio.

From these considerations, several important implications can be derived. It is obvious that the basic-nonbasic ratio varies greatly among cities.<sup>7</sup> It should similarly be clear that the base ratio tends to change over time. It may in fact alter with each increase in basic employment into the economy. The instability of the base-nonbase ratio in growth situations may well cancel out much of the benefit which could accrue to the analysis from precise measurement of the ratio. In addition to being altered, perhaps radically and quickly, by the growth process itself, the base ratio may be also changed by a number of external causes such as government expenditure policies, shifts in industrial location patterns, technological and institutional innova-

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<sup>7</sup> John W. Alexander, "The Basic-Nonbasic Concept of Economic Function", Economic Geography, XXX (July 1954), 246-61.



tion, and changes in social customs.<sup>8</sup>

Despite these limitations in the character of the base-nonbase ratio, it has provided a tool of prediction through the simple multiplier associated with the base ratio. With an increase in exports through expansion of basic activities, there will be an increase in the earnings of locally owned factors employed in these basic industries. This will usually involve an increase in employment in the non-localized industries. The result is an increase in total disposable community income which will induce increases in localized employment and income. In typical multiplier analysis fashion, the increases can be separated into direct and indirect effects. The latter account for increases in the production of intermediate goods used as inputs into the expanding export industries. Computation of these input alterations may be complicated in this particular situation by the problem of linked activities. Where the linkages are not clearly delineated, problems will emerge in evaluating the full multiplier effects. It will depend on the technique used to identify the nature of the activity. When the firm-by-firm method, or the survey approach, is used, the linkage problem emerges, but when the location quotient is employed no indication of the linkages between industries is given so

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<sup>8</sup> See R. B. Andrews, "Mechanics of the Urban Economic Base: Causes and Effects of Change in the Base Ratios and the Ratio Elements (I)", Land Economics, XXXI (May 1955), 144-55; James Gillis and William Grigsby. "Classification Errors in Base Ratio Analysis", Journal of the American Institute of Planners, 22 (Winter 1956), 17-23.







the problem is avoided, though not necessarily solved.

In addition to associated production level changes with an alteration in the operations of export industries, the Keynesian-type income-consumption multiplier is activated. This accounts for the changes in income flows because of the autonomous increase in total community income. There is both the direct effect of the increase in income in the basic activities with the resulting changes in demands by consumers in the local economy, and the indirect effects of the associate increase in incomes of the nonbasic activities which react to the effects of the initial income changes. Generally, the employment effects closely correspond to these changes in income.<sup>9</sup> For this reason and because employment data are much easier to obtain than income data, planners have shown a strong bias to derive their multipliers from employment information.<sup>10</sup>

The simple employment multiplier used by these planners is

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<sup>9</sup> In comparing his income multiplier with Kahn's employment multiplier, Keynes indicated that they would tend to be identical except for the occurrence of non-proportional returns to scale, changes in the distribution of income and changes in wage and price levels, all of which would change the proportions between output (or income) and employment [J. M. Keynes, The General Theory of Employment, Interest and Money (London: MacMillan and Co. Ltd., 1937), 115-116].

<sup>10</sup> The outstanding pioneering study of this type is by George H. Hildebrand and Arthur Mace, Jr. ["The Employment Multiplier in an Expanding Industrial Market: Los Angeles County 1940-47", Review of Economics and Statistics XXXII (August 1950), 241-249]. Also see Gerald Everett Thompson, "An Investigation of the Local Employment Multiplier", Review of Economics and Statistics, XLI (February 1959), 61-67.



derived directly from the base ratio. Assuming a base ratio of 1:3 for a particular urban unit, an increase in basic employment of 1,000 would induce an increase of 3,000 in localized activities for a total labor force increase of 4,000 workers.<sup>11</sup> The value of the employment multiplier is 4 in this instance. Associated with this would be a calculable rise in the total population of the urban area. By knowing or being able to estimate future growth in a city's export industries, a city planner might project the growth of the city's overall population and so derive guidelines for public spending to accommodate the anticipated population. Similarly, studies of this nature provide a guide to private investment in that city.

Before proceeding further, it should be mentioned that the working out of the multiplier process is not instantaneous. The alteration in basic employment may occur rather quickly but there will be a lag before local employment attains the proportions predicted by the base ratio. In addition, it is possible that at the time of a change in the base industries, the effects on local employment of previous changes have not worked themselves out completely so that the

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<sup>11</sup> Gillies and Grigsby, op. cit.; Richard B. Andrews, "Mechanics of the Urban Economic Base: Causes and Effects of Changes in the Base Ratios and the Base Ratio Elements (II)", Land Economics, XXXI (August 1955), 246; W. Lean and B. Goodall, Aspects of Land Economics, (London: The Estates Gazette Limited, 1966), 204-5.



base ratio is initially incorrect.<sup>12</sup> Then prediction of the effect of a given base employment change on local employment cannot accurately be made. Any increase in basic employment accompanied by an increased local employment increases the size of the city. In keeping with the hypothesis that as the city's population grows, its base ratio falls, it would seem that the marginal base ratio related to a particular change is smaller than the average base ratio which is the starting point of the multiplier process.<sup>13</sup> This would be necessary for the average base ratio to decline with each increment to the city's population.

Still another problem of the employment multiplier is that the base ratio applies to no particular export activity and as such the effects of an increase in the employment in one basic industry may not have any resemblance to the effects of a similar increase in another.<sup>14</sup> Here again the problem of linkage between basic industries and others is critical. If an industry buys most of its inputs (other than labor) from external markets, the multiplier effect on the economy will be noticeably less than if most inputs are purchased from localized firms. This problem is observed although not necessarily

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<sup>12</sup> Walter Isard, et al, Methods of Regional Analysis: an Introduction to Regional Science (New York: The Massachusetts Institute of Technology, 1960), 200.

<sup>13</sup> C. T. Stewart, Jr., op. cit., 332-333.

<sup>14</sup> W. Isard, op. cit., 203.







satisfactorily solved by use of the firm-by-firm base identification process. Use of indirect approaches such as the location quotient method, as indicated previously, ignore this problem by failure to be concerned with firm interdependence or linkage.

The employment multiplier approach does provide a workable procedure for explaining urban economic growth. Its real value is limited, on the other hand, by the various weaknesses that its simplicity allows to creep into its structure. The use of the base-nonbase employment ratio has been acceptable to a large number of planners, but economists have tended to draw on an income approach which is more solidly grounded in economic theory.



## CHAPTER IV

### THE INCOME APPROACH TO THE ECONOMIC BASE

The employment multiplier approach to growth prediction of urban areas has been shown to contain various limitations, largely as a result of its simplicity. This seems to indicate the need for a more sophisticated analysis. Dealing in terms of income provides a more complete picture by indicating the stimuli to changes in basic activities and leakages that may occur to dampen the effects on the local activities. While employment multipliers cannot incorporate adequately into their structure such effects as induced increases in community imports with increases in incomes, the exporting to other areas of increased saving, decreases in public relief as unemployment falls, changes in tax payments to external fiscal bodies and by non-resident sources to the local fiscal bodies, and changes in local factor earnings paid to external owners, income analysis provides a basis for studying these.

The objective of this chapter is to explain the effect of the growth-inducing export industries on the urban economy in terms of an income accounting technique. A direct transfer from Keynesian national income determination is not possible although the basic elements of the urban multiplier are derived from it. Of special significance is that



an urban economy is "open" whereas the national economy, especially if it is large, is affected to a much lesser degree proportionally by the "rest-of-the-world". That the urban accounts are strongly influenced by external factors is consistent with the hypothesis that the growth of basic activities in an urban area is the propagator of overall economic growth in that community. D. C. North bases his theory of regional economic growth on the proposition that a region grows as a result of success at selling its exportable commodities in world markets.<sup>1</sup>

At the level of regional studies, this approach has been considered by several writers in different ways.<sup>2</sup> Basically they have tried to show that growth of regional income depends on expenditures of non-residents of the region through the foreign trade multiplier. Only a few alterations are necessary to make the regional method compatible with urban growth theory.

Following Keynesian-type relations, an urban unit's income,  $Y$ ,

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<sup>1</sup> D. C. North, "Location Theory and Regional Economic Growth", Journal of Political Economy, LXII (June 1955), 243-58.

<sup>2</sup> See Rutledge Vining, "The Region as a Concept in Business-Cycle Analysis", Econometrics, XIV (July 1946), 201-218; Walter Isard, op. cit., 205-213; Charles M. Tiebout, The Community Economic Base Study, op. cit., Chapter 6; E. J. Hanson, "Regional Employment and Income Effects of the Petroleum Industry in Alberta" (paper presented to the Council of Economics, American Institute of Mining, Metallurgical and Petroleum Engineers, 1966), 13-21.





is defined as

$$(1) \quad Y = C + I + G + X - M$$

where C is expenditure on consumer goods and services by the residents of the urban area, I is the gross investment expenditures of the urban area, G is gross government expenditure of the area, X is expenditures for exports and M is expenditures by the residents of the urban area for imports.

Imports consist of imports of consumption goods ( $M_c$ ), imports of investment goods ( $M_i$ ), the import content of government expenditures ( $M_g$ ) and the import content of exports ( $M_x$ ). That is,

$$M = M_c + M_i + M_g + M_x$$

The ratio of local consumption expenditures on local goods and services to local income, or the propensity to consume local goods, is

$$(2) \quad \frac{C - M_c}{Y} = \frac{C}{Y} - \frac{M_c}{Y} = \frac{C}{Y} \left( 1 - \frac{M_c}{C} \right)$$

$C/Y$  is the marginal propensity to consume and  $M_c/Y$  is the proportion of local expenditures for consumption accounted for by imports of consumer goods. Assume now that  $M_i=0$ ,  $M_g=0$  and  $M_x=0$ . Dividing (1) by Y and substituting from (2) yields

$$(3) \quad \frac{I + G + X}{Y} + \frac{C}{Y} \left( 1 - \frac{M_c}{C} \right) = 1$$



$$1 - \frac{C}{Y} \left( 1 - \frac{M_C}{C} \right) = \frac{I+G+X}{Y}$$

Let the left side of this equality be  $1/k$

$$\frac{1}{k} = \frac{I+G+X}{Y}$$

$$(4) \quad Y = k(I+G+X)$$

Then  $k$  is the simple average "interurban" trade multiplier.  $k$  is the multiple of the sum of investment, government expenditures and exports which accrues to the urban area to determine its income.

By an analogous procedure it is possible to indicate the change in urban income resulting from a change in investment, government expenditure, exports or any combination of these. That is,

$$\Delta Y = k^*(I+G+X)$$

where  $k^*$  is the marginal interurban trade multiplier. In this instance the marginal propensity to consume would be  $dC/dY$  and the marginal rate of change of imports of consumer goods with changes in total consumption would be  $dM_C/dC$ . Hence,

$$k^* = 1 - \frac{dC}{dY} \left( 1 - \frac{dM_C}{dC} \right)$$

Further reality may be added to the formulation of the inter-urban multiplier by a relaxation of the assumption that only  $M_C \neq 0$ .

Assuming that  $M_I \neq 0$  allows for the import of investment goods. Then to



delineate the impact of urban investment on urban income it is necessary to subtract the import of investment goods which substitute for urban production of such goods. Then (3) will be of the form:

$$(6) \quad l = \frac{I-M_i+G+X}{Y} + \frac{C}{Y} \left( 1 - \frac{M_c}{C} \right)$$

$$1 - \frac{C}{Y} \left( 1 - \frac{M_c}{C} \right) = \frac{I-M_i+G+X}{Y}$$

Substituting with  $l/k$  again gives

$$\frac{l}{k} = \frac{(I-M_i)+G+X}{Y}$$

$$(7) \quad Y = k \left[ (I-M_i)+G+X \right] .$$

Similarly,

$$(8) \quad \Delta Y = k^* \left[ (I-M_i)+G+X \right] .$$

It is likewise possible to take account of the import content of government expenditures and the import content of exports by relaxing the assumptions that  $M_g=0$  and  $M_x=0$  respectively. Then the impact of local government expenditures will be  $G-M_g$  and the impact of exports will be  $X-M_x$  because exports are not entirely produced from locally produced inputs. With these alternatives equations (4) and (5) now appear

$$(9) \quad Y = k \left[ (I-M_i) + (G-M_g) + (X-M_x) \right]$$

$$(10) \quad \Delta Y = k^* \left[ (I-M_i) + (G-M_g) + (X-M_x) \right] .$$





The analysis thus far has made it possible to see the impact that a change in export demand will have on the urban area's income. This formulation has also shown the impact of changes in local investment and the expenditures of local government on urban income. As any of these increase, the income of the community grows at a rate depending upon the multiplier. In addition to being affected by exports, the income of a community may also be affected through a multiplier effect by other forms of non-resident funds being injected into the local economy.

Gross domestic investment may be broken down into investment for both export ( $I_x$ ) and residentiary ( $I_r$ ) activities.

$$I = I_r + I_x$$

Non-resident funds for investment ( $N_i$ ) may be allocated to either of these types of investments. Non-resident funds may also be used to finance local government expenditures ( $N_g$ ). These arise from payments of taxes by foreign owned businesses to the local government and from securities sold by the local government to non-residents. Non-resident funds also enter the urban area through expenditures of the federal and provincial or state governments in the area ( $G_n$ ). Hence the total income contributions of non-residents ( $N$ ) consists of four major components:

$$(11) \quad N = N_i + N_g + G_n + X$$



where  $X$  represents expenditures of non-residents on exports less the import content of exports (called  $X-M_x$  previously).

Referring back to the original accounting identity, it may be said that

$$(12) \quad C+I+G+X = Y+M = N+R$$

where  $R$  is the funds spent by residents of the urban area.

$$Y = N+R-M$$

$$(13) \quad Y = (N-M_n) + (R-M_r)$$

where  $M_r$  is the import content of expenditures from resident funds and  $M_n$  is the import content of expenditure from non-resident funds such that  $M = M_n+M_r$ . Dividing (13) by  $Y$  yields

$$1 = \frac{N-M_n}{Y} + \frac{R-M_r}{Y}$$

$$(14) \quad 1 - \frac{R-M_r}{Y} = \frac{N-M_n}{Y}$$

Equation (14) is equivalent to (3) so that the left side of the equality can be made equal to  $1/k$ . Then

$$\frac{1}{k} = \frac{N-M_n}{Y}$$

$$(15) \quad Y = k(N-M_n)$$

such that  $k$  is the multiplier showing the impact of non-resident funds



on urban income. More completely

$$(16) \quad Y = k [(N_i + N_g + G_n + X) - M_n], \text{ and}$$

$$(17) \quad \Delta Y = k^* [(N_i + N_g + G_n + X) - M_n]$$

which shows the changes in Y for changes in the various external factors.

This should sufficiently outline the basic analysis relating the growth of an urban area to exports. As has been clearly indicated, urban income is affected by a number of types of injections of non-resident funds of which expenditures for exports is only one. It will, nevertheless, be a vital stimulant of growth if exports bulk large as has been shown to be true in urban studies. That other items may promote the growth of urban income does not weaken the validity of the economic base concept. Although they may be supplemented by these other elements, exports remain the key factor in the inducement of complementary activities in an area.<sup>3</sup> The flexibility of the income approach over the rigid employment multiplier can be shown by analyses

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<sup>3</sup> See North, op. cit. The argument by Tiebout ["Exports and Regional Economic Growth", The Journal of Political Economy, LXIV (April 1956), 160-165] that exports are not all that essential because as an area gets larger (to the extent of a country like the United States) it exports little, is hardly valid. Implicit within the economic base argument is that there is a critical size of unit, depending on the location of residentiary activities serving export activities. Within the United States there will be many of these trading units such that the value of external trade by the United States is far less than the value of exports for the country when the inter-unit trade is considered.





of problems of variable multipliers among different activities, and of problems of time.

As was suggested in the previous chapter, the impact of a change in one growth-inducing activity may be very different from that in another activity. This complication is interrelated with the linkage problem and with the variability of sources of inputs locally as opposed to externally. Hence the multiplier effect will vary among the various activities and the effects on  $Y$  will be the sum of changes in the activities.

$$(18) \quad Y = k_a(N_a - M_{na}) + K_b(N_b - M_{nb}) + \dots + k_l(N_l - M_{nl})$$

where  $a, b, \dots, l$  denote the various activities. Each activity has its own multiplier.

Another of the perplexing features of the employment multiplier was its failure to account for the time that must elapse from changes in export activity to the time of the total change in the economy's income. There was the problem that at any time the basic-nonbasic ratio with which a given basic inducement started, might not be correct because some previous change had not worked itself through the multiplier process completely. Whether the income analysis provides a solution to these "time" problems is debatable, but it does at least provide an indication of the direction in which clarification of the problem lies.

The adjustment to residentiary activities and thus to total



urban income  $Y$  does not occur instantaneously with an increase in  $N$ . At best the new value of  $Y$  will lag behind the change in  $N$  by one time period. That is,

$$(19) \quad Y^{t+1} = k(N-M_n)^t$$

where  $t, t+1, \dots$  are the sequence of time periods. When the set of activities each with its own multiplier rates is considered, the total change in  $Y$  will await the working out of the slowest multiplier.

$$(20) \quad Y^{t+x} = k_a(N_a-M_{na})^{t+\alpha} + k_b(N_b-M_{nb})^{t+\beta} + \dots + k_l(N_l-M_{nl})^{t+\sigma}$$

where  $\alpha, \beta, \dots, x, \dots, \sigma$  correspond to no set time values relative to one another except that  $x$  is equal to the longest of  $\alpha, \beta, \dots, \sigma$  after time  $t$ .

The conceptual model constructed above is enlightening in spelling out the mechanics of the urban economy. When thoughts of collecting data to fit it are considered, however, the awkwardness of this theory is revealed. Planners have generally avoided even the simplest type in income accounting methods in their studies of urban growth.

Having demonstrated the various components of foreign expenditures which affect the local economy, the emphasis of the study can now be shifted to an analysis of the reactions of the local residents to a change in external income. This will show the effects of changes in export activities, among other things, on the local economy. The



procedure is one of breaking down urban income into workable components by evaluating average propensities to consume, save, invest and so on, and by considering the induced effects of these from changes in non-resident expenditures on the income of the community as a whole.

Considering initially the short-run situation, suppose there is an increase in non-resident expenditures ( $\Delta N$ ). The income which residents receive from this increase in exports and other things is partly spent on local goods and services which in turn creates increased local income because of increased sales of local consumption, goods and services. Of the income accruing to residents from increased exports, only a percentage, say 50 per cent, is spent locally on goods and services. That is, 0.5 is the propensity to consume locally. Of this 50 per cent only a portion, say 40 per cent, goes to the local activities as income in the form of wages, salaries, profits and rents. The remaining 60 per cent is spent on non-local factors of production. Thus 0.4 can be labelled the income propensity of the local sales dollar. Using as a pattern the Keynesian form of the multiplier  $1/(1-b)$ , where  $b$  is the marginal propensity to consume, the change in urban income relative to a change in exports is of the form:

$$(21) \quad \Delta Y = \Delta N \frac{1}{1-(.5 \times .4)} = \Delta N \frac{1}{(1-bq)}$$

The total change in urban income for any change in exports depends on the propensity to consume locally ( $b$ ) multiplied by the income created





by each dollar of local consumption sales ( $q$ ).

In the short run, local investment is not influenced by internal factors such as the level of urban income. Rather it will depend on various outside forces such as the general credit conditions and interest rates prevailing in the larger economy. For this reason local investment may be treated much like exports as an external stimulus to the change in income in short-run analysis.

In the long run, local investment becomes vitally responsive to changes in local income. When local income from export sales increases and local consumption rises, investment in new plants and equipment is required. There is a propensity to invest in local capital goods as well as a propensity to consume locally for every dollar of income earned from increased exports. Not all the local investment stays within the community since some is paid out for importation of needed investment goods. Then the simple long-run consumption-investment multiplier is

$$(22) \quad \Delta Y = \Delta N \frac{1}{1 - (bq + dp)}$$

where  $d$  is the propensity to invest locally and  $p$  is the income created by a dollar of sales for local investment.

To add more detail to the analysis, the local investment sector could be divided into three components: local housing investment, business investment, and local government investment. This split



in investment may be incorporated into equation (22) to show a more complete long-run multiplier model.

$$(23) \quad \Delta Y = \Delta N \frac{1}{1 - (bq + d_a p_a + d_s p_s + d_g p_g)}$$

where  $d_a$ ,  $d_s$ , and  $d_g$  are the propensities to invest in local business, to invest in local housing, and of local government to invest respectively; and  $p_a$ ,  $p_s$ , and  $p_g$  denote the income created per dollar of investment in each.

In this income analysis there has been a shift in emphasis from the basic-nonbasic ratio to a ratio of local consumption to total income. The latter really is expressing the same thing about the nature of the economy as the former but it is more comprehensive and is consequently more adequate for predicting growth. In the simple economic base theory, there seems to be the implication that exportable commodities provide the only vital stimulus to urban growth. The use of the more complete income approach shows the importance of investment from both local and non-resident sources in propagating rises in urban income. Thus this theory of urban growth is made more compatible with general growth theories which emphasize the essential nature of capital flows.



## CHAPTER V

### CAPITAL FLOWS AND THE ECONOMIC BASE

Up to this point we have been concentrating on urban growth of a relatively simple kind, the growth of total employment and total income leading to population growth projections. In view of the analysis that will be presented in this and the following chapter, careful attention to the meaning of "growth" is imperative. In these chapters, an attempt is made to show the relationship between the economic base growth concept and the conventional theories of economic growth which emphasize investment as the source of growth. The latter consider growth to be a rise in the per capita level of income.

I would like to suggest that for the purposes of the analysis to be made here, these refer to the same phenomenon by different approaches. The economic base clearly points toward a growth of population through the mechanism of a growing total income. If a growth of per capita income occurs, signifying growth in the conventional sense, then, providing this has not resulted merely from a decrease of population, total income grows. A rising per capita income should prompt an inflow of people and hence a growth of the variety the economic base concept talks about. Because of the assumptions about rising investment that are employed in this analysis, it is virtually





impossible that growth of per capita income because of an out-migration of population could occur. The likelihood that population will grow at a faster rate than total income is slight because of the relative slowness of labor mobility. The difficulty of trying to make the two definitions of growth compatible is that there are fundamental differences in the goals of the two approaches involved. The economic base concept tries to get a projection of population growth so that appropriate policy can be formulated whereas the "macroeconomic" growth models are concerned with the welfare of the population in terms of individual incomes.

Another complication arises from the amalgamation of the economic base concept with conventional economic growth theory. Until now the discussions have been in terms of comparative statics; models of economic growth, on the other hand, should be dynamic in nature. This dichotomy cannot be brushed aside with the ease with which the definition of growth was settled. In the analysis of Chapter VI, however, a solution will emerge.

This chapter serves mainly as a means of transferring from the simple economic base to the more rigorous growth models. For the moment we want to consider only whether the export position of an urban area as expressed by the economic base approach is consistent with the flows of capital that result from that particular export position. Implicit in the analysis is the assumption that the export induced growth and growth arising from investment are different approaches to observing the



same phenomenon. For the present purposes this is acceptable, but in the subsequent chapter it will be shown that the two are not exactly the same and that it is really a two stage process.

It is of major significance that an urban economy is open to world markets because this means that investments may be the result of the importation of foreign capital as well as domestic saving. Because the typical urban area has proportionally more trade with external areas than a country is likely to have with other countries, net foreign investment is very important in consideration of urban growth.<sup>1</sup>

Whereas in the previous chapter the various elements comprising non-resident funds were considered to be mutually exclusive, in the theory of capital flows there is a definite relationship between these components. It is possible to be exporting to other areas and at the same time be a receiver of investment funds from external sources. When the net trade position and net investment position are considered, however, it will be evident that a positive net exporting position is equivalent to a negative net foreign investment position. Hence in this chapter, it is possible to speak in terms of the net export position and thereby state what the net foreign investment position is implicitly. For the overall trends in urban growth only the net position need really be considered. The purpose of the breakdown in the previous chapter was to show what comprised the net

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<sup>1</sup> In urban economics, any area outside the unit being considered is "foreign".



position.

When a region exports more than it imports it has a surplus on its current account. Because this must be balanced by a deficit of an equal amount on the capital account, there is an accumulation of financial claims on foreigners. This is the same as saying that the exporting country is making positive foreign investments in those areas to which it exports more than it imports. The net value of exports for a region is equal to its net outflow of capital. When a community is in a position of a deficit on its current account, therefore, it is a net importer of capital or has a negative net foreign investment position. This implies that because more capital is available for investment, its rate of growth should be higher than the rate of growth of a community that is a net exporter of capital. Basically importing areas grow faster than exporting areas.

This raises the question of how an increase in exports, as advocated by the economic base theory, is consistent with this relationship of growth to imports of capital.<sup>2</sup>

We assume that there is an increase in external demand for the exportable commodities of some urban area. The relative prices of these exports will rise and this will increase the share of earnings of both labor and capital, these being considered the principal inputs

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<sup>2</sup> J. Thomas Romans, Capital Exports and Growth Among U.S. Regions, (Middletown, Connecticut: Wesleyan University Press, 1965), 79-81.







in production of the exports. With respect to capital, the return on investment in that export industry will be greater relative to investment elsewhere than previously such that more capital, including foreign funds, will be attracted into the activity. On the labor side, total income is increased such that consumer demands on local activities serving the community are increased. There may be either an increase in the number of workers at or near the same wage level or the labor force may stay at the same size with wages rising because of increased marginal productivity of workers. The initial deficiency of residentiary activities causes residents to increase their imports of goods and services more than exports from the community were increased. The marginal propensity to consume plus the marginal propensity to invest or the marginal propensity to spend is greater than one.<sup>3</sup> Residents would probably also be investing in local service activities out of past savings, realizing the demand for these and the profitability of investment in them.

If there were no excess capacity in the economy prior to the initial change in export demand, this analysis is consistent with the economic base concept. There is, as a result of increased export production, a growth in the residentiary activities of the community. Capital for this is brought into the community from foreign sources

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<sup>3</sup> George H. Borts, "The Theory of Long-Run International Capital Movements", The Journal of Political Economy, LXXII (August 1964), 341-343.



which balances the current account deficit created when the goods and services which the residentiary activities should eventually produce must be imported. If unused capacity did exist in the economy initially, then growth would not occur until the slack that existed had been eliminated. Exports have maintained their role as the volatile element in growth as the economic base concept would have it, but there is definitely a dependency on the mobility of capital between areas conditional to the validity of this assertion. The theory of the economic base has not been disarranged by being placed in a position of compatibility with a theory of capital flows.

This situation can be further explained by reverting to an accounting framework similar to that used in the previous chapter. Construction of a simple conceptual flow-of-funds formulation will show the position of capital flows for an urban area. From this procedure, determination of the size of net exports, or net foreign investment, can be indicated.

Each urban area receives a portion of gross national income which may be called gross urban income and is a measure of the gross income of the resources of the urban area. Definitionally equivalent to gross urban income is gross urban product which is the portion of gross national product attributed to an urban area. It is the total output produced by resources owned by residents of the urban area, evaluated at market prices. It should be pointed out that gross urban income is not a measure of income earned by resources located in the



urban area, but is rather a measure of income received by the urban area. Income is allocated to the urban area where the owner of a resource is a resident. Gross urban income can be expressed as

$$(1) \quad GUY = C+S+T_n$$

where C is urban income consumed, S is the amount saved, and  $T_n$  represents the taxes paid less the amount of government transfer payments which must be deducted because they are not earned through employment of resources owned by residents. Gross urban product, in a closed economy, would be the equivalent of domestic expenditures.

$$(2) \quad GUP = C+I+G$$

when C is consumption spending, I is gross investment, and G is purchases by government. In an open economy, as urban areas are, gross urban product will include net exports. When gross urban income is greater than domestic spending on the output of the urban area, foreigners purchased the rest of the output.

Because gross urban income equals gross urban product, it may be said that

$$(3) \quad C+S+T_n = C+I+G+Net\ X$$

$$Net\ X = C+S+T_n - (C+I+G)$$

Cancelling C on both sides of (3) yields

$$(4) \quad Net\ X = S+T_n - (I+G)$$





This shows that, if  $T_n$  and  $G$  be ignored temporarily, an urban unit with savings exceeding investments will be a net exporter of goods and services and will consequently be accumulating claims on foreigners or carrying out positive net foreign investment. Similarly, if net exports were negative, investment in this urban unit would be greater than domestic saving indicating that foreigners were investing in this urban area.

To refer to a community as a net exporter of goods and services only reveals part of the story. Net exports may also include net income on investments. This is especially important because it is the difference between the income received by an urban unit and the income produced there. By subtracting net income on investments from gross urban income received, it is possible to come up with a figure for gross urban income produced or a measure of gross output from resources located just in that urban area. Net income on capital is a function of past lending such that by subtracting it from current net exports, will give an estimate of new net foreign investment.

Net exports are affected by government expenditures as indicated by  $G$  in (4). Federal and provincial or state government purchases are not always made in proportion to the incidence of taxation. Considering the small size of urban units, where government consumption is on the basis of benefit,  $G$  could be a decisive factor



influencing net exports or net foreign investment and consequently the relative growth rate of the city.<sup>4</sup>

The flow of funds accounting framework we have been following is on two distinct levels. There is a private flow-of-funds which represents the excess of savings over investment and the public flow-of-funds, tax collections by government minus expenditures in the urban area by government. When the flows into the urban economy through investment from external sources and federal and state or provincial government expenditures exceed savings and taxes less transfer payments, the economy is a net importer of capital and in an advantageous position to attain rapid rates of growth. This is the stage which arises from increased export activities in economic base analysis.

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<sup>4</sup> W. Leontief's study by the input-output technique of the impact of military expenditures by the United States government on the regions of that country shows the variable effects of the government sector [ "The Economic Impact - Industrial and Regions - of an Arms Cut", The Review of Economics and Statistics, XLVII (August 1965), 217-41 ] .



## CHAPTER VI

### THE DYNAMICS OF URBAN GROWTH

In this chapter it will be shown that there is a relationship between the static growth model described by the economic base concept and the more conventional dynamic theories of economic growth. The resolution made in the previous chapter regarding the definition of the term "growth" holds throughout this analysis. It has been demonstrated that a flow of capital must accompany an area's net trade position, but not how the investment resulting is responsible for a particular measure of growth. With the more sophisticated implications of capital flows, the multiplier based on the propensities to consume and invest is not totally adequate and tools of analysis indicated by conventional growth theory provide additional relevant information.

For explanatory purposes, growth should be considered to occur at two distinct levels. Growth originates fundamentally because of an increase in export demand. This is the static growth process we have been discussing all along, and it can, for convenience, be labelled Type I growth. It follows from the North thesis<sup>1</sup> and is the basic principle on which the economic base theory is constructed. In fact, the base ratio approach is a short-cut technique for calculation of the overall effect on the economy on the basis of past reactions

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<sup>1</sup> North, op. cit.





because of changes in export demands. It is a typical comparative statics situation in that it merely describes two points of equilibrium, the latter being "the response of a system to changes in given parameters".<sup>2</sup>

The second level involves examining dynamic growth theories to see how growth takes place. The term "dynamic" is used because these models tell how the system moves from one point of equilibrium or comparative static level to another.<sup>3</sup> This is the process by which the initial stimulus which is known in the economic base analysis leads to the results which are determined by the economic base study. It is designed to show how a certain size investment has a calculable effect on the economy and it may be called Type II growth. Hence, although the economic base concept provides a reason for why growth should occur, it takes an investment theory of growth to explain how this happens. Within the comparative static framework, there is a dynamic mechanism. This provides a solution to the problem mentioned in the previous chapter of the inconsistency between static and dynamic growth.

Given any change in investment, the total change in urban income can be calculated through use of the familiar multiplier

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<sup>2</sup> Samuelson, Paul Anthony, Foundations of Economic Analysis (Cambridge: Harvard University Press, 1963), 351.

<sup>3</sup> Ibid., 352.



analysis. This operation provides an estimate of the urban growth in static terms that can be expected.<sup>4</sup> The interest of the subsequent analysis lies in what dynamic tools of analysis can be gleaned from an examination of two specific "macroeconomic" growth theories that are concerned with rates of growth -- the Domar model and the neoclassical approach. It is primarily a matter of isolating the influential variable of these models and of determining how they can aid in explaining the urban growth process as set forth fundamentally by the economic base concept. Hopefully, theoretical consistency between these dynamic models and the economic base, which should help to eliminate some of the misconceptions about the base technique, will lead to significant policy implications which will suggest a more inclusive planning program.

#### The Domar Growth Model

Because of the assumption of the Keynesian system that employment is a function of national income, it does not provide a means of deriving an equilibrium rate of growth or the rate of growth at which the economy must expand in order to remain in a continuous state of full employment. Hence the assumption is made by Domar that employment is a function of the ratio of national income to productive capacity:

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<sup>4</sup> Multiplier analysis uses a comparative statics framework although the question it seeks to answer is dynamic in nature because of the time lag involved. See Gardner Ackley, Macroeconomic Theory (New York: The MacMillan Company, 1961), 312-313.



Domar goes beyond the Keynesian system in his realization of the essential nature of investment influencing productive capacity.

Investment both increases productive capacity and generates income in the Domar model. It provides two sides to an equation, the solution of which will yield the "required rate of growth".

Initially let us examine a simplified version of the Domar model as applied to a closed economy.<sup>1</sup> The simplifying assumptions are made that there are no time lags between events in the process, there is a constant general price level, and the values of income, investment and savings are net values with depreciation taken into account. We attempt to construct an equation with one side representing the increase or rate of increase of productive capacity and the other the increase or rate of increase of income. The solution, as indicated, yields the required full-employment rate of growth.

On the demand side it is necessary to assume that  $s$ , a constant, is the fraction of income that is saved. For any given  $s$ , also called the marginal propensity to save, an increase in national income ( $Y$ ) is

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<sup>1</sup> See Evsey D. Domar, "Capital Expansion, Rate of Growth and Employment", Econometrica XIV (April 1946), 137-47; and by the same author, "Expansion and Employment", The American Economic Review, XXXVII (March 1947), 34-55, reprinted in M. G. Mueller (ed.), Readings in Macroeconomics (New York: Holt, Rinehart and Winston, Inc., 1966). For additional relevant information see J. Thomas Romans, op. cit., 76-81; Thomas F. Dernberg and Duncan M. McDougall, Macroeconomics (2d. ed; New York: McGraw-Hill Book Company, 1963), 204-211; and Harry G. Johnson, International Trade and Economic Growth: Studies in Pure Theory (London: Unwin University Books, 1958), 120-139.







a function of the increment in investment (I). This yields a multiplier-type formulation

$$(1) \quad \Delta Y = \Delta I \frac{1}{s}$$

where  $1/s$  is the multiplier. This means that at any time, the investment needed to employ existing capital fully is the output of existing equipment (which definitionally is equal to income) multiplied by the marginal propensity to save.

$$(2) \quad I = sY$$

This assumes that the Keynesian static equilibrium of savings equal to investment holds.

On the supply side, the assumption is made that there is a constant capital coefficient (b) or ratio of capital to output. Then the increase in output that the system can produce is  $I/b$  or  $Ia$  where  $a$  is the reciprocal of  $b$ , the ratio of output to capital.<sup>2</sup>

$$(3) \quad \Delta Y = Ia$$

where  $\Delta Y$  is the increase in productive capacity. It should be noted

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<sup>2</sup> Domar originally made allowances for the productive capacity of the whole economy to increase at a smaller amount than  $Ia$  because investment in certain productive areas might cause a transfer of labor and other factors from other plants thereby reducing their productive capacity. The new value for  $a$  he calls the "potential social average investment productivity". We are ignoring the implications of this manipulation in this analysis. (see Domar, "Capital Expansion, Rate of Growth, and Employment", op. cit., 140-41)



that on the supply side, the change in productive capacity is affected not by the increment in investment but in the level of investment. Hence there is a lack of symmetry between the effects of investment on national income and on productive capacity.

Assuming that national income is equal to productive capacity in a state of full employment equilibrium, then to maintain this they should grow at the same rate. Equating the increases in each [ equations (1) and (3) ] yields the fundamental equation

$$(4) \quad \Delta \frac{I}{s} = I_a$$

$$\frac{\Delta I}{I} = s a = r$$

where  $r$  represents the required rate of growth. Because  $\Delta I/I$  is the percentage rate of growth of investment, the conclusion to be drawn from this equation is that the maintenance of full employment requires that investment grow at the rate  $sa$ . Further, since the marginal propensity to save,  $s$ , is fixed, income must grow at the same percentage rate as investment. Although investment is a part of both sides of (4), it does not take the same form on the supply side where it is a stock value as it does on the demand side where it represents an increment or rate of increase. As long as net investment is positive, productive capacity will increase. But for income to increase the increment of investment must be increasing. This dual character of investment is fundamental to the Domar analysis. Following directly



it can be shown how situations of less than full-employment and unused capacity can develop so that an economy deviates from its required rate of growth.<sup>3</sup>

To apply the Domar model to an open urban economy, we begin by recalling the accounting framework of the previous chapter, ignoring, for the sake of simplicity, government expenditures, transfers and taxes. "Imports as well as savings constitute leakages from effective demand and exports as well as investment may fill the gap between domestic demand for and supply of home production at capacity output."<sup>4</sup> Hence,

$$(5) \quad S+M = I+X$$

$$\text{or } (s+m)Y = I+X$$

where  $m$  is the fraction of income spent on imports (the marginal propensity to import) and  $X$  is exports by an urban area.

Considering the role of net imports in the form of a capital account surplus in promoting growth, the required or full-employment rate can be expressed as

$$(6) \quad r = a(s+m - \frac{X}{Y})$$

$(m - X/Y)$  is the area's export balance and may be called  $d$  such that

<sup>3</sup> Domar, "Expansion and Employment", op. cit.

<sup>4</sup> Johnson, op. cit., 122.





$$(7) \quad r = a(s-d)$$

and the growth rate is shown to be dependent on savings and the net inflow of capital.

What relevant conclusions can be drawn from the Domar analysis? Although Domar refers to increments to investment needed to obtain a certain growth rate and in our analysis the concern is with the effect of an increment to investment on the economy, there is a relationship in the variables that influences these. By observing how the marginal propensities to save and import and the capital-output ratio affect the income-investment relationship in the Domar model, it is possible to get a clearer understanding of the growth theory behind the economic base concept. Savings and the net inflow of capital in the Domar model correspond to the increment in investment in the economic base approach because they both represent what is added to the capital stock in a certain time period. The incremental investment multiplied by the capital coefficient induces a certain rate of growth and the greater is the increment (through savings and the net inflow of capital) the higher is the rate of growth that can be expected. Although the objectives may be different, the theory employed in one and implicit in the other show that the economic base approach has a theoretical foundation that is not inconsistent with conventional growth theory.

A digression is now made to indicate the added influence of the net inflow of capital compared to the simple closed Domar model. It follows directly from the open model formulation that the larger is the



ratio of net imports to income, the higher is the equilibrium rate of growth. The net importing urban areas are receiving foreign investment which stimulates their growth rate in excess of investment which arises from domestic saving. The investment stimulated growth which arose originally from an increased export demand works its way through the economy by the usual multiplier procedure. It brings about a growth in residentiary activities in response to the increase in demands on export industries and may also have a continuing effect on the expansion of export industries.

Harry G. Johnson has shown the relation between the rate of growth of exports and the equilibrium growth rate of the economy over time by a comparison of the rate of growth of exports ( $x$ ) with the initial equilibrium rate of growth ( $r_0$ ).<sup>5</sup> When  $x > r_0$ , the equilibrium growth rate ( $r$ ) tends to decrease so that effective demand will not outrun the capacity to produce. The effective demand by local consumers must fall so that  $r$  is decreasing because a large proportion of output is exported. Similarly, if  $x < r_0$ , the equilibrium growth rate tends to rise so that effective demand can keep pace with capacity to produce. The lower is the initial level of exports, the higher will be the net import-income ratio. The lower the rate of growth of exports overall, the higher the equilibrium growth rate. It should again be stressed that this may be related to the economic base theory

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<sup>5</sup> Ibid., 121-24.



only if imports rise more than proportionally with an increase in export activity. This can logically be expected assuming neither unemployment nor excess capacity exists in the economy and that local nonbasic activities are inadequate to handle increased consumer demands.

### Neoclassical Growth Theory

In recent years, more emphasis has been placed on neoclassical theories of growth which differ from the Domar formulation primarily in that they are interested in factor substitution in production and thus are concerned with why investment occurs in the first place rather than the importance of investment which Domar emphasized. Capital and labor will be substituted for one another depending upon the rate of return on capital and the wage rate, both of which are flexible. These substitution possibilities have particularly interesting implications when the possibility of interregional mobility of factors is considered. What this approach really amounts to is an attempt at elimination of resource misallocation. To begin with, we shall summarize the general neoclassical growth theory applied to the urban economy.<sup>1</sup>

Suppose there are  $h$  regions or urban units in a country between which resource mobility and substitutibility are assumed. Each has a linear, homogeneous production function of the form,

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<sup>1</sup> See George H. Borts and Jerome L. Stein, Economic Growth in A Free Market (New York: Columbia University Press, 1964), 7-13; and Romans, op. cit., 85-91.







$$(7) \quad Y_i = f(K_i, L_i, t), \quad (i = 1, 2, \dots, h)$$

subject to constant returns to scale.  $t$  is a time variable to measure the effects of technological change. In any urban unit the value of output in constant prices is  $Y_i$ , the value of the capital stock is  $K_i$ , and the labor force is  $L_i$ .

On the assumption of constant returns to scale, the marginal rate of return on capital multiplied by the capital input may be called the capital income share ( $m_i$ ). Similarly, the marginal value product of labor by the labor input may be referred to as the labor income share ( $w_i$ ). The rate of change in an urban area's output can be expressed as

$$(8) \quad \frac{dY_i}{Y_i} = m_i \frac{dK_i}{K_i} + w_i \frac{dL_i}{L_i} + T$$

Where  $T$  is the rate of shift of output resulting from the technical change. It has a neutral effect on the rest of the equation.<sup>2</sup> It should also be indicated that inherent in the nature of  $m_i$  and  $w_i$  is that their values sum to one.

The free flow of labor and capital among urban areas will equalize  $m_i$  and  $w_i$  among communities. In equilibrium, the marginal product of capital in every region will be equal to the national rate of interest ( $n$ ). Thus the capital income share in each region can be

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<sup>2</sup> Romans, op. cit., 86-7.



expressed

$$(9) \quad m = \frac{\partial Y}{\partial K} - \frac{K}{Y} = \frac{K}{Y} n$$

Insofar as the national rate of interest is constant, then in order for the capital income share to be constant over time, output and capital must grow at the same rate. That is,

$$(10) \quad \frac{dY}{Y} = \frac{dK}{K}$$

Substituting (10) into (8) it is possible to solve for the rate of growth.

$$(11) \quad \frac{dY}{Y} = m \frac{dY}{Y} + w \frac{dL}{L} + T$$

But because  $m = 1-w$ ,

$$(12) \quad w \frac{dY}{Y} = w \frac{dL}{L} + T$$

Dividing both sides by  $w$ ,

$$(13) \quad \frac{dY}{Y} = \frac{dL}{L} + \frac{T}{w} = \frac{dK}{K}$$

Hence,

$$I_s = dK = K \frac{dL}{L} + \frac{T}{w}$$



where  $I_s$  is the equilibrium level of investment. It is the level of investment which is neutral to the existing income differentials among regions. If the ideal situation with respect to the rates of return between inputs prevails interregionally,  $I_s$  will ensure that it continues, assuming all other variables are constant.

Let us consider the significance of this model for the growth of urban areas. We know there is a certain increment to the capital stock ( $I_s$ ) which maintains the equilibrium rate of growth. What we need to consider is the possibility that the interest rates on capital vary among different urban areas. It may be assumed initially that there is a set of prevailing rates of return to capital among the urban units. The investment that will maintain the prevailing rate for any community may be called "secular" investment and is the same as  $I_s$ . It is "that level of investment which maintains the equilibrium of equality of marginal products between regions."<sup>3</sup> Any variance between actual investment and this secular investment may be called "non-secular" investment. In the real world the existence of non-secular investment is the result of interregional variations in the growth rates of regional employment, the rate of technical change and capital intensity. According to the neoclassical hypothesis, there should be a trend in investment among urban areas toward interurban equality of the marginal productivity of factors. The capital flows that comprise

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<sup>3</sup> Ibid., 87.





nonsecular investment are the instrument by which this equilibrium is attained.

Assuming that capital and labor are the only two significant factors, a low capital-labor ratio should attract positive non-secular investment which will have equilibrating influences on interurban differences in the rate of return to factors. Non-secular investment is positive because actual investment exceeds the equilibrium level of investment or secular investment. In some cases, however, the dominance of labor force mobility (in this case, of labor moving in) may force the capital-labor ratio lower in which case the non-secular investment is classified as disequilibrating because it does not at least compensate for the lowering influence of labor and the capital-labor ratio. Similarly, with a high capital-labor ratio, non-secular investment may be negative (secular investment greater than actual investment) such that the capital market has an equilibrating influence on the economy provided its overall effect is not reversed by movements in the labor force. It is only because factors, especially the labor force, can be affected by non-economic as well as economic stimuli that these disequilibrating trends emerge.<sup>4</sup>

It can be seen that there is a relationship between the neo-classical idea of investment and the incremental investment character-

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<sup>4</sup> Hugh O. Nourse, Regional Economics (New York: McGraw-Hill Book Company, 1968), 190.



istic of the economic base formulation. Any known magnitude of incremental investment as a result of saving and a net inflow of capital has a predictable equilibrating or disequilibrating effect on the returns to the productive factors among urban areas.

The ultimate conclusion of the neoclassical growth model is that because of interest rate variation between urban areas, those areas that offer high rates of return on investments have net import surpluses, and are in a negative net foreign investment position because their high interest rates attract capital. This shows its close relationship to the economic base approach. The net inflow of capital following from an increase in the demand for exports of an area results in high growth rates for that area. The rates of return on capital must be relatively greater to induce this inflow. According to this theory, those areas that receive inflows of capital should be relatively low income communities, probably using labor intensive production techniques. On the other hand, high income communities should be net exporters of capital and be characterized by high wages and by low rates of return on capital.

As in the Domar model, neoclassical growth theory does not try to solve the problem of how a certain level of investment affects the growth of the community. Again the purpose of examining it was not to derive a method of evaluating these effects but rather to determine the elements which influence that growth. The rate of growth of income depends on the changes in the labor and capital



inputs which are influenced by the rates of return offered in a community for these factors. The neoclassical model is concerned with finding the level of investment which equalizes these rates of return among communities. The economic base analysis works in reverse, trying to establish to what extent a certain size investment will lead to an equalization of the rates of return. In the case of a single community this may be interpreted to mean estimating its growth. Hence, the theory of the economic base is consistent with this form of conventional growth theory in the sense that they are dependent on the same variables in deriving their respective solutions.

The basis of the neoclassical growth theory, the equalization of returns to factor inputs, has been the subject of some recent studies from which implications related to the foregoing can be drawn.<sup>5</sup> With respect to the United States economy, it has been shown that over certain periods of time there has existed the situation in which the real wage level and the marginal efficiency of investment in some regions have both been higher than the national average in other regions. The former are obviously growing regions and the latter declining ones. This condition defies the logic of the neoclassical growth theory. On discovering that such a situation existed, Borts manipulates the concepts involved to derive an explanation in theoret-

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<sup>5</sup> See particularly George H. Borts, "The Equalization of Returns and Regional Economic Growth", The American Economic Review, L (June 1960), 319-346.







ical terms under conditions of a fixed production function among urban areas and constant returns to scale throughout, both of which would be unlikely. If they did not exist they could explain the reason for the simultaneous growth or decline of real wages and the marginal efficiency of investment and Borts' analysis would be unnecessary.

When there is but a single uniform commodity being produced in each region, the difficulties with respect to the flows of capital and labor not equilibrating the marginal efficiency of capital and the wage level interregionally will not be encountered. When two or more separate output sectors in a region are considered, however, it may be that instead of merely changes in factor combinations and factor payments occurring, there may be a reallocation of the region's output. Borts' analysis leads to the conclusion that:

. . . the real wage in the region depends upon the marginal physical product of labor and the prices of the region's outputs relative to the price of its inputs. The marginal efficiency of investment depends on the marginal physical product of capital in the region and the prices of the region's exports relative to the prices of domestically produced and imported capital goods. Even though the marginal physical product of labor is inversely related to the marginal physical product of capital through factor proportions, favorable movements of the relevant price ratios may raise both the real wage and the marginal efficiency of investment.<sup>6</sup>

We are drawn inevitably to the conclusion that a region's growth depends to a considerable extent on the behavior of the prices

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<sup>6</sup> Ibid., 326.



of its export sector. A high wage region may well grow more rapidly than a low wage region because the demand for its export commodities grows while that of the low-wage region does not. Because the high and low wage regions may be producing different export commodities, furthermore, the export boom of one region will not be shared by others. Assuming that increased export sales means a higher rate of investment, a high-wage region may have a greater rate of growth than a low-wage region. The findings of Borts seem to add a measure of validity to the assertion which this paper has emphasized throughout with respect to the vital role of export demand in stimulating urban growth.<sup>7</sup> Borts initially was trying to show that growth came about as a result of the inequality of returns to factors interregionally -- the neoclassical hypothesis -- and found that this alone could not take credit for growth. This does not contradict the hypothesis made earlier about the consistency of the neo-classical model variables to the economic base theory because here we are again talking about growth at the lower Type I level -- what stimulates it initially.

#### Economic Implications of Dynamic Theory

To demonstrate further the consistency of the conventional growth models with the economic base concept, we should measure the

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<sup>7</sup> Again the conflicting meaning of the term "growth" is encountered and again we maintain the explanation at the start of Chapter V holds.



empirical consistencies as well as talk about the theoretical ones. Although this thesis is a theoretical study and empirical work has been largely avoided, a divergence from the trend is now made in order to examine the growth implications of the capital-output ratio which is the vital variable in these dynamic approaches to growth. Sufficient practical work has been done on other aspects of the economic base that the need of laying out those procedures here has not arisen, but this particular consideration has been empirically explored to a less rigorous extent. Assuming that growth depends on the level of new capital formation multiplied by the capital-output ratio, we may examine Canadian growth experience to see what effects this has had.

At the level of regional study, these are fairly obvious. Statistics indicate that efficient natural resource industries are relatively more capital intensive in Canada than is production of manufactured goods. In addition, those regions that are prominent in production of raw materials, particularly Alberta and British Columbia, are the fastest growing regions of Canada in terms of population. Not only is this an indication that this type of industry attracts larger amounts of new capital because of its nature but also that the capital-output ratio must be relatively high.

The relationship to urban growth is not so easily explained. Resource production is rarely an export industry of the larger cities, although cities certainly do share in the growth rates this production induces in the region where the cities are located. Industries







directly associated with resource production frequently locate in cities. Examples are transportation, communication, storage, governmental administration, and manufacturing related to the resource industries of the region. The activities grow generally in proportion to the growth of the resource industries of the region so that it can be expected that investment will occur in this sector at relatively the same rate. In addition, city growth will be a function of the capital-output ratio of the types of production that bulk large or form the export activities there. The city of Edmonton, for example, has most of its export production centered in activities characterized by high capital-output ratios, such as the petroleum industry.

Some statistical data can be employed to indicate how analysis along these lines may be performed. Table 1 shows that the average annual growth rates of population and total personal income in the provinces of Alberta and British Columbia exceed by a considerable margin the national averages for the period 1947-63 and, in fact, exceed the averages for any other individual province. The per capita personal income rate of growth has not been as high because of the large increases in population, but still has been increasing.



Table 1  
Growth of Provincial Personal Income and Population, 1947-63  
 (Average annual percentage change in current dollars)

Province	Personal Income Per Capita	Total Personal Income	Population
Ontario	4.6	7.5	2.8
British Columbia	4.4	7.7	3.1
Alberta	4.1	7.6	3.4
Saskatchewan	4.9	5.6	0.7
Manitoba	4.3	6.0	1.6
Quebec	4.9	7.5	2.5
Nova Scotia	4.2	5.5	1.3
New Brunswick	4.1	5.6	1.4
Prince Edward Island	5.4	6.3	0.8
Average for Provinces	4.5	6.6	2.0

Source: Second Annual Review, Economic Council of Canada, Towards Sustained and Balanced Economic Growth, p. 108. Based on data from Dominion Bureau of Statistics.

We make the assumption that the growth of these provinces is dominated by natural resource industries. In Table 2, Derek A. White's capital-output table for selected industries has been broken up into groups of industries characteristic of city regional production processes. Raw material production is compared with secondary industry production in terms of the change in the ratio of capital stock to gross domestic product for the period 1947 to 1963. Because of the frequently highly changeable values of the capital-output ratio from year to year, five year averages are used for the comparison. An increase in the capital-output ratio in these industries indicates an inflow of investment into regions like British Columbia and Alberta



Table 2  
Ratio of Capital Stock to Gross Domestic Product  
for Selected Canadian Industries  
 (5-year averages based on 1949 dollar estimates)

Industry	1947-51	1959-63
I Raw Material Production		
Forestry	.687	1.195
Fishing	2.012	2.245
Mining, quarrying, oil wells	2.222	2.642
Paper products	3.223	3.857
Non-metallic minerals, petroleum, coal	3.655	3.616
Wood products	1.607	1.528
Average	2.231	2.514
II Secondary Industries		
Trade	.987	1.256
Food and beverages	1.963	2.105
Tobacco, rubber, leather	1.290	1.339
Textiles	2.170	1.943
Clothing	.835	.806
Chemicals	2.919	2.886
Miscellaneous and Manufacturing	1.272	.896
Printing and publishing	1.772	1.629
Average	1.651	1.607
III City Industries Related to Production*		
Transportation	1.719	1.965
Storage	.874	.773
Communication	2.861	3.159
Average	1.818	1.969

\*The capital-output ratio for this category is based on investment in machinery and equipment but not on investment in construction. The estimates in the other two categories are based on all three forms of investment.

Source: Derek A. White, Business Investment to 1970, (Economic Council of Canada, Staff Study #5, 1964), Appendix B, Tables B-9 (a) and B-9 (c). Based on data from the Dominion Bureau of Statistics and the Royal Commission of Taxation and estimates by the Economic Council of Canada.





that are predominant in these activities. This explains the rapid rate of growth in these regions. Meanwhile, there has been a slight decline in the capital-output ratios of the secondary industries.

Table 3  
Index of Local Specialization  
for Selected Industrial Classifications  
 Edmonton, 1961

Industry	Index	Industry	Index
Forestry	.09	Leather	.06
Fishing and Trapping	.03	Textiles	.06
Mines, quarries and oil wells	1.15	Clothing	.61
Petroleum and petroleum products	3.23	Printing and publishing	.76
Non-metallic mineral products	.86	Chemicals and chemical products	1.13
Wood	.46	Miscellaneous manufacturing	.40
Paper	.18	Transportation	1.24
Food and beverages	1.06	Storage	1.40
Tobacco products	.01	Communication	1.20
Rubber	.07	Trade	1.37

Source: Based on Dominion Bureau of Statistics, Census of Canada, 1961, and formula on page 17.

The third category has been drawn from White's calculations to show the effect of regional trends in the resource and secondary industries on certain service industries. Although the capital-output ratio of these activities has risen over the period studied, conclusive results are not forthcoming directly. We need to examine the index of local specialization to see if these industries can be classified as export activities of the city by this employment technique of the



economic base (see Table 3). For Edmonton, this happens to be true, so it is likely that the growth of the capital-output ratio of category III has caused some growth of the city overall.<sup>1</sup>

In addition, the two most capital intensive of the eight secondary industry categories in the 1959-63 average both have an index of local specialization in Edmonton greater than one. The only other industry with an index of local specialization greater than one that occurs among White's selected industries is trade and although the capital-output ratio is smaller than the average for category II, this is partially counteracted by a more than 25 per cent growth in the capital-output ratio for that industry between the two five-year periods examined.

The weaknesses of this analysis are realized. Edmonton, it may be claimed represents nearly a polar case in that it acts as a service center for a rapidly growing region. This makes it relatively easy to identify the basic activities which must also be growing rapidly. In the case of cities where the base is not so clearly defined, the results would not be so conclusive as those derived for Edmonton. The objective of following this procedure has obviously not

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<sup>1</sup> Over the ten year period 1951-61, the total percentage increase in population of the twelve large metropolitan areas in Canada (in 1961) was 45.5 per cent. Edmonton, one of the twelve, had a population growth rate of 91.0 per cent over the same time span. [1961 Census of Canada, Volume 1, Population: Incorporated Cities, Towns, and Villages, Dominion Bureau of Statistics. Bul. 1.1 (Ottawa: Queen's Printer, 1963)] .



been to attempt an exhaustive treatment but merely to indicate possible considerations in evaluating the empirical consistency of the economic base theory with growth theories that are based on the free flow of investment funds and flexible capital-output ratios.

Not only the capital-output ratio but also the capital-labor ratio yields growth implications. Were adequate data available, some similar relationships might well be shown to exist with respect to the capital-labor ratio. To adequately understand the capital-labor ratio, the concept of the elasticity of substitution must be introduced.

The elasticity of substitution is a measure of the ease with which one factor may be substituted for another factor.<sup>2</sup> When the elasticity of substitution is greater than one, substitution between factors is made with relative ease. This is represented graphically by an isoquant tending to be a straight line. Conversely, when the elasticity of substitution is less than one, substitution is relatively more difficult and becomes increasingly so as it approaches zero. When the elasticity of substitution equals zero, the isoquant would be right angled indicating that production requires fixed proportions of each factor. In economic terms, the elasticity of substitution represents a ratio of the percentage change in factor inputs to the percentage

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<sup>2</sup> Murray Brown, On the Theory and Measurement of Technological Change (Cambridge: University Press, 1966), 9-27.







change in the marginal rate of technical substitution of one factor for the other, or the percentage change in the ratio of the prices of the factors.

From information about the elasticity of substitution for a certain urban area, it could be estimated what the effects of a change in either factor would have on the other and thus what the growth implications for the community as a whole would be. In a manner similar to that used for the capital-output ratio, we could demonstrate the empirical consistency of the neoclassical model with the economic base theory through knowledge of the substitutability of factors and the capital-labor ratio.



## CHAPTER VII

### POLICY SUGGESTIONS OF THE DYNAMIC APPROACH

In Chapter VI of this thesis, we have shown that the Domar model of economic growth and the neoclassical approach to growth may be suitable to explain how there is a transfer from one static equilibrium position to a new equilibrium. These two dynamic approaches are linked in that the Domar model shows the importance of investment as the key to growth and that the neoclassical model suggests why investment occurs in the first place -- because of the mobility of factors and the desire to achieve interregional equalization of returns to factors. Certain refinements of these approaches as represented in other growth models may provide a more comprehensive explanation of the process of growth, but these two, because of their generality, seem to provide the best starting point as far as the scope of this thesis is concerned.

Now we wish to proceed beyond the purely theoretical considerations of the Domar and neoclassical models to suggest what each might provide for the urban planner in terms of policy implications. By showing in addition to the theoretical consistency between the Domar and the neoclassical models that some practical usefulness exists, planners have a broader foundation than provided by the economic base approach alone on which to base their analysis and advice for interested



segments of the economy. We proceed by selecting the significant features of each of the models on which policy may be based. Had growth theories with other theoretical characteristics been used, policy implications other than those stated hereafter would be possible. Even for these two approaches the list of implications given here may not be exhaustive, but at least some indication of the value of incorporating these theories with the economic base concept is evident.

#### Policy Implications of the Domar Model

The relationship between investment and employment is emphasized in the Domar model. There is a certain rate of investment that is required if full employment is to be maintained. The interdependence between employment and investment must obviously have important implications for urban planners. Only if sufficiently high rates of investment are maintained will full employment of the productive capacity be assured. If planners are able to foresee that a period of insufficient investment will ensue, then they will be able to anticipate the effects on employment levels. This may also be accompanied by a decline in the rate of growth of population of that particular urban unit. Planners should be able to calculate the extent of the decline in population from the degree of deficiency of investment that exists or is expected. Knowing such a relationship between employment and investment exists will enable planners to advise business and government of the most rational procedure in





developing residentiary activities.

What actually is being suggested is that planners must look at more than just the simple economic base concept when advocating policies. They should examine also whether investment and projected investment will fully employ the export activities existing and being developed. In this way policy suggestions are based not only on the residentiary requirements of an export sector at a particular time but over a period of time as suggested by the investment pattern of the community.

The net import to income ratio which emerges from the theoretical discussion of the open economy Domar model of the previous chapter provides a second set of implications. The inference is that the larger is the ratio of net imports to income, the higher will be the equilibrium rate of growth, given the capital-output ratio.<sup>1</sup> Knowledge of the net import to income ratio enables planners to state what the rate of growth of the community is. If planners know or anticipate a certain net import-income ratio will persist, they will be able to ascertain the level of growth (according to our assumptions, of both per capita income and population) that is likely to accompany it. Once again the Domar formulation provides information which planners may transfer to interested sectors of the economy so that it

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<sup>1</sup> See page 64.



may be translated into action in terms of residentiary activity. The planner is basing projections not only on the static conditions that exist in the community, but also on the rate of investment that is indicated by the size of net imports relative to the community's income position.

Capital-output ratio analysis, which has already been discussed in the final section of Chapter VI, provides yet another set of implications. Stress on the capital-output ratio follows directly from the Domar model's emphasis on investment. Chapter VI has shown that the capital-output ratio not only indicates results consistent with the economic base concept but also that it may be employed as a planning tool in its own right. The size of the capital-output ratio suggests the amount of investment that may be required to establish an activity or operate it under competitive techniques. Whether an industry is established or grows in a region may well depend upon whether investment funds are available to establish the operations at the desirable capital-output ratio level. Whether it is feasible for certain industries to be established or expand can be estimated by planners who then advise operators or potential operators of residentiary activities on this basis. In this way the growth (of both population and per capita income) of a community may be related to the capital-output ratio.



### Policy Implications of the Neo-classical Model

Whereas the Domar model stresses the importance of investment in growth, the main interest of neo-classical growth theory is the reason why investment is made at all. This is accomplished by an emphasis on factor substitutability, or more specifically, changes in the capital-labor ratio. It is the result of variable rates of return between urban centers for capital and other factors. Because of the lack of empirical validity of the pure neo-classical approach, as has been shown by Borts,<sup>2</sup> to consider the neo-classical policy implications it will be best to base them on Borts adaptation rather than on the pure theory.

The elasticity of substitution yields perhaps the most significant implications of the neo-classical model. This concept was briefly introduced in the previous chapter. As indicated then, it is basically a measure of the ease with which one factor can be substituted for another. In the case where substitution is made with comparative ease, varying the size of the labor or capital component is not particularly damaging in terms of wasted resources. When production requires factors in more or less fixed proportions, however, and capital is in excess relative to labor, then some investment may be wasted. This situation is reasonably unlikely, though, because additions of

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<sup>2</sup> See pages 71-73.





capital merely increase productivity through technical advance. More serious is the case where labor is overabundant relative to the level of capital and the production processes require a fixed amount of labor per unit of capital. In such instances, planners would be induced to urge such measures as a restrictive immigration policy that would limit the size of the labor force to that which could be employed by the available capital and anticipated increases.

The interaction of the rates of return to factors between urban regions is another source of policy implications. The alleged convergence of the rates of return among regions has been shown not to occur in many cases in the real world. When planners are aware that regional differences in the rates of return are likely to persist, they are able to suggest policies that will best suit the character of the urban area being considered. The failure of there to be an interurban equilibrating of the rates of return is usually the result of non-economic factors causing such things as labor immobility. To exemplify policy derivatives of planners knowledge of labor immobility, we may hypothesize a situation where a low wage area has a labor force that shows reluctance to move to higher wage areas. Planners will make policy suggestions to residentiary interests of the economy that will stress the continued need for increasing residentiary activities. This would not be the same policy suggestions expected from the general neo-classical presentation by which the low-wage area would experience very small or possibly negative changes in population and labor force.



Policies must be based on the more realistic interpretation of an existing situation.

Technical change is another of the components of the neo-classical model which yield policy implications. If planners are able to foresee the coming of production alterations in certain export industries in a community, then they will be able to make predictions which take into account the effects that technical change has on both capital and labor. If the technical changes are, for example, ones which call for a reduction in the labor force relative to capital (i.e., labor saving), then this will have effects on decisions of operators of residentiary activities. It may, for example, cause them to carry on their activities at a less intensive pace than if technical change had not occurred because the population they now serve is smaller.



## CHAPTER VIII

### A DEFENSE OF THE ECONOMIC BASE CONCEPT

Without stating specifically what they were, certain inherent weaknesses led us to depart from the study of the simple economic base concept. We are now in a position to examine these alleged shortcomings and to attempt to determine whether or not the manipulations of the more sophisticated analyses tends to prove them to be unjustified so that the overall position of the theory of the economic base as an approach to urban growth study is strengthened.

The weaknesses may be classified as being of three types: conceptual, analytical, and empirical. At the conceptual level, Hans Blumenfeld points out that there are two inconsistencies in the formulation of the economic base theory. First, it apparently contains biases toward both mercantilism and the physiocratic doctrine which he feels are mutually exclusive schools of thought that cannot justifiably be reconciled in a single approach.<sup>1</sup> Secondly, he finds another inconsistency in the concept's apparent attempt to deal with both the matter of identifying the activities critical to growth of

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<sup>1</sup> Hans Blumenfeld, "The Economic Base of the Metropolis", in Ralph W. Pfouts (ed.), The Techniques of Urban Economic Analysis (West Trenton, New Jersey: Chandler-Davis Publishing Company, 1960), 241-44.





an urban area and the process of setting out a community's balance of payments in terms of the whole spectrum of activities in the community.<sup>2</sup> Yet another conceptual weakness is the contention that because much of the responsibility for urban growth is attributable to external demand for the products of the community, promotion of urban growth is largely out of the hands of the community involved and dependent instead on the trends in national demand patterns.<sup>3</sup>

Of the analytical criticisms, the most severe is the assertion that it is the nonbasic sector of the economy that is more fundamental to the promotion of urban growth than are rises in export demand. In effect this attacks the fundamental theory underlying the economic base concept.<sup>4</sup> In addition, it has been claimed that there is a decrease in the applicability, and hence in the validity, of the base-service ratio for predictive purposes as the size of the community grows.<sup>5</sup>

Empirical weaknesses of the economic base technique have been indicated by Pfouts in studies of cities in the United States. These claim to cast further doubt on the worth of the approach by showing it

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<sup>2</sup> Ibid., 249-53.

<sup>3</sup> Charles E. Ferguson, "Statics, Dynamics and the Economic Base", in Pfouts (ed), The Techniques of Urban Economic Analysis, 334.

<sup>4</sup> Blumenfeld, op. cit., 273-7.

<sup>5</sup> Ibid., 238-9.



to be invalid in actual usage.<sup>6</sup>

Despite awareness of these criticisms, in the last four chapters we have proceeded to try to present a theoretical justification of the base approach through showing its consistency with the theory of income determination and with theories of growth that have a wide measure of acceptance among economists. The question which arises at this point is whether this intensified analysis alleviates the burden of criticisms which the simpler economic base technique has been made to endure whenever it has been used. It would seem that many of the criticisms are misconceptions which have arisen because of the use of an incomplete description of the base approach by planners or by their inability to realize its implications in economic terms. Because the primary purpose of this study has been to show the economic content involved in the simple base concept, only by establishing a means of refuting at least some of these criticisms does the study make a worthwhile contribution. Even if theoretical reasons for refuting the criticisms cannot be found, then at least by the more intensive analysis this study has proposed, a better total understanding of the economic base emerges so that arguments supporting or against the criticisms are conclusive.

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<sup>6</sup> Ralph W. Pfouts, "An Empirical Testing of the Economic Base Theory" in Pfouts (ed.) The Techniques of Urban Economic Analysis, 292-306; and Ralph W. Pfouts and Erle T. Curtis, "Limitations of the Economic Base Analysis", Social Forces XXXVI (1957-58), 303-10.



### Conceptual Problems

It is not unfair to argue that the economic base contains elements of both mercantilism and physiocracy. But merely because characteristics basic to opposing doctrines appear in the same theory does not mean it is inconsistent. Depending on the assumptions, the two elements can be mutually exclusive and yet exist simultaneously. Even within each of the two doctrines, their framework and their policy predictions often do not imply definitional consistency. Basic to mercantilism is the obligation to export more than one imports. To classify the economic base concept by such rigid terms would be unjust. The physiocrats placed prime emphasis on the superiority of the production of food and raw materials as opposed to manufactured goods in promoting growth of the economy. To say that the base concept makes this assertion is similarly unfair. Rather than regarding the economic base concept as finding its precedent in a particular doctrine of historical economic significance and thus being able to claim it is inconsistent because it overlaps two such conflicting doctrines, it should be acknowledged as a theory in its own right with its own characteristics which, in this case, are consistent although at one time they may have been the basis of opposing theories.

If Blumenfeld is implying that the economic base shows favor to production of raw materials and foods over manufactured goods, then I must disagree. The base approach merely asserts that growth occurs as a result of an increase in exports, regardless of whether these be







raw materials, manufactured goods or specialized functions such as financial institutions, governmental administration, educational and health services, or retirement havens.

The "export or die" bias holds only in the sense that rarely, if ever, could a community be totally self-sufficient and since it must import certain commodities, it must similarly export some to attain a balance of payments equilibrium with external areas. By examining the more detailed accounting framework that has been presented in broadening the simple base concept, it can be seen that exporting is inherent in the nature of the community, as opposed to being a purposeful policy which the mercantilist doctrine implied. In addition, the economic base technique accepts that new imports may well exceed any increase in exports. Without the aid of the flows of capital analysis as applied to the base concept, Blumenfeld might have been able to sustain his claim of a mercantilist bias, but the more complete picture shows that such an accusation is not unequivocally valid.

It is contended that both the criticality of individual activities and the balance of payments of the community as a whole are important to growth analysis, but that a clear distinction between them has frequently not been established by users of the economic base. In fact, in many cases, even that a dual problem of this type exists has not been specified. Blumenfeld claims that the base technique appears to be trying to solve within one framework, two



problems which require different approaches. On the one hand, it tries to identify the industries critical to inducing growth while, on the other hand, it attempts to evaluate actual sales by a community relative to some standard to see to what extent the community has grown. Our new approach helps to rectify this immediately by concentrating on income rather than employment so that the balance of payments implications are clear at least. Accurate gross values of exports and imports, government taxes and transfers, and interest and dividends in both directions emerge such that just where any community stands in this regard is obvious.

Blumenfeld was aware of this value of the income approach but he did not realize how there could be a reconciliation of the critical activities with the simple balance of payments accounting formulation because he had not an analysis of the growth process as we have presented it. The critical sectors are those activities whose export demands increase or those which are affected by the Type I growth. The balance of payments is affected by all activities including those changed by the multiplier arising from the alteration in the critical export commodities. The criticality is not as easily identified by use of employment data because it must be determined by its effects on the overall economy. By using the rough estimation of the employment base-nonbase ratio, no estimate of the effect of a particular export demand change shown by increased employment is clearly indicated, as opposed to the effect of a change in another



industry. When the complete income approach is used, however, such that the total effect of the multiplier accompanying any export demand change is obvious, the criticality of any activity is clearly defined at the same time that the balance of payments position of the community is known.

The argument that because export demand stimulates the growth of an urban area, control of urban growth is largely out of the hands of the community cannot be refuted. It is tied so closely with the fundamental theory of the economic base that to try to challenge it would be to attack the concept we have been defending. In addition, it would constitute asserting that the "nonbase" sector is more crucial to growth than is the export sector and this is a more serious criticism, the validity of which must be denied.

#### Analytical Problems

The inference that non-exporting service activities are the base of a community strikes at the core of the economic base theory. It should be clearly understood that some service activities such as financial institutions, health and educational services, and recreation facilities for tourists to name a few, are basic to urban areas. Non-basic services, such as gas and power lines, water and sewage systems, recreational facilities for the local population and local transportation and communication conveniences, are our main interest here.

Admittedly, there have been cases where nonbasic services were put in place ahead of the productive activities they were meant to serve.







The outstanding example in Canada's history as a nation was the building of the Canadian Pacific Railway. A similar, as yet unproven, attempt at regional development is the Alberta Resources Railway.

These examples differ from the nature of this study in that we are concerned with growth, not development, of urban areas, not regions or nations. Some services may be needed before an industry locates in a particular urban unit, but overloading of existing facilities temporarily is usually possible when it expands, realizing that this overloading will induce the improvement and enlarging of those facilities.

For a community to initiate growth by investing in nonbasic services, it must be prepared to finance the growth effort by borrowing. If the industries that these services are built to serve never materialize, the community would suffer because it will not attain the revenue from these facilities that it anticipated originally. In addition the risk on such investments would be high making it more expensive to attract the needed capital. When increased export demand stimulates growth, there is little risk because the activities demanding the service facilities are already in place. Equation 10 of Chapter IV indicated that domestic investment and government expenditures could be responsible for growth but, as asserted then, exports constitute the prime motivating force. This confusion may suggest interesting "laissez-faire" versus planned economy implications since leaving growth to the freedom of external demand amounts to a kind of non-interference whereas the putting in place of social



capital through establishment of nonbasic services is an attempt to attract industries and increase the possibility of a viable export base in the future.

The contention that there is a decrease in the applicability of the base-nonbase ratio because of the decrease in the size of the ratio with the growth of the community appears to be a valid characteristic of the economic base concept. It cannot be refuted but by being aware it exists, allowance can be made so that the predictions are not as inaccurate as they might be. The improved accuracy of the technique helps in this regard as guessing about the decline of the ratio is largely eliminated and a systematic method of calculating it emerges.

#### Empirical Problems

The attempts of Pfouts and Curtis to show whether the base-nonbase ratio is an empirically justified approach to projecting urban growth leads them to the conclusion that it is not. In their analysis, they work with employment data and expect that if the economic base concept holds true, there should be a significant positive correlation between the growth of a community's population and the growth of the base-nonbase ratio over a certain specific period of time.<sup>1</sup> When such a correlation is found not to exist, Pfouts suggests that the theory must be formulated incorrectly.

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<sup>1</sup> Pfouts and Curtis, op. cit., 304-5; and Pfouts, op. cit., 394-5



Perhaps he should not have been so hasty to dispose of even the simple employment base ratio. He should acknowledge at least that even over the short time period of his study the reactions of the nonbasic activities to any change in export activities will probably cause the base ratio to shrink, although both the denominator (nonbase) and the numerator (base) increase, because the former increases more than proportionally to the latter. This is consistent with the contention of Blumenfeld, mentioned earlier, that the size of the base decreases proportionately with the growth of the overall size of the community because as it grows the community becomes progressively more self-sufficient so that it is required to carry on relatively less trade with external areas.

By examining more precisely the causal structure of changes in the economy, a feature which the more extensive approach provides but the simple technique does not, it is likely that such a misconception as Pfouts fell into could be avoided. This provides good reason to praise this new approach. We should, however, remember that securing data which will be needed for the predictions is much more difficult than obtaining the simple employment figures.

What practical use can be made of the theoretical manipulations of this thesis? It would seem that if the statistical data needed to apply the complete income approach of the economic base could be developed, then there would be a solid reliable method of predicting urban growth.







By means of the fundamentals of conventional growth models, it can be seen that investments resulting largely from the capital flow accompanying a certain net trade position lead to a particular rate of growth. The figure for rates of growth may be converted to calculations of the amount of growth over a certain time period, provided the assumptions at the beginning of Chapter V hold. From the Domar model it is obvious that this depends on the capital-output ratio to a considerable extent. Neoclassical approaches suggest that the marginal productivity of capital and labor have a distinct influence on the rate of growth of an urban economy because they will establish a relationship between investment and labor force size in one community and that in other areas. Knowledge of these calculations will provide planners with a more comprehensive foundation on which to base predictions than is possible from the simple employment ratio or even the elementary income techniques which rely on investment propensities which are not always as easy to derive as are the capital-output ratios of industries in an area and the marginal efficiency of capital.

These practical derivatives of the theoretical analysis help in projecting the extent of growth of the community. On being able to calculate growth in income, estimates of overall population growth can be made and thus estimates of the needs for public and private investment in certain specific projects can be determined more accurately. This, after all, is the principal reason why the planner is so concerned



with growth.

### Other Growth Techniques

Rather than try to overcome the problems of shortages of data to fit the economic base technique involving the sophisticated income approach, planners have tended over about the last ten years to use altogether different methods of calculating growth. The most popular of these are input-output and, more recently still, linear programming.<sup>1</sup> Input-output is attractive because it clearly shows the interdependence that exists among the productive sectors of the

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<sup>1</sup> The input-output technique was first presented by W. W. Leontief [ "Quantitative Input-Output in the Economic System of the United States", The Review of Economics and Statistics XVIII (August 1936), 105-25 ]. For descriptions of input-output, see Robert Dorfman [ "The Nature and Significance of Input-Output", The Review of Economics and Statistics, XXXVI (May 1954), 121-133 ], and William H. Miernyk [ The Elements of Input-Output Analysis (New York: Random House, 1965) ]. Outstanding practical studies have been done by Walter Isard and Robert H. Kuenne [ "The Impact of Steel Upon the Greater New York-Philadelphia Industrial Region", The Review of Economics and Statistics, XXIV (November 1953), 289-301 ]; Frederick T. Moore and James W. Petersen [ "Regional Analysis: An Intermediary Model of Utah", The Review of Economics and Statistics, XXXVII (November 1955), 368-83 ], and Leon N. Moses [ "The Stability of Interregional Trading Patterns and Input-Output Analysis", The American Economic Review, XLV (December 1955), 803-832 ].

Linear programming was developed in 1947 by George B. Dantzig [ "Maximization of a Linear Function of Variables Subject to Linear Inequalities", in T. C. Koopmans (ed.) Activity Analysis of Production and Allocation (New York: John Wiley and Sons, Inc., 1951), 339-347 ]. Explanations of linear programming formulation can be found in the comprehensive work by Robert Dorfman, Paul A. Samuelson, and Robert M. Solow [ Linear Programming and Economic Analysis (New York: McGraw-Hill Book Company, Inc., 1958) ]. Walter Isard et al [ Methods of Regional Analysis, 413-492 ] and Benjamin H. Stevens [ "An Interregional Linear Programming Model", Journal of Regional Science, I (Summer 1958), 60-98 ] show practical uses of this technique.





economy. It has become so widely used that we compare it as a growth technique with the economic base without explaining its details, assuming that it is part of the economist's general knowledge.

A fundamental difference between the two is that input-output emphasizes the production side of the economy, with little attention focused on spending patterns of consumers. The income approach of the economic base technique places the major share of its concern on the aggregate consumption function. The propensity to consume is affected by factors in addition to current income and by emphasizing consumption, the economic base can isolate and make use of these variables. Examples of these factors are such circumstances as the tendency for households to spend proportionally more on imports with a rise in income and the relation of the number of years residence in a community to household consumption of local goods.

The outstanding merit of input-output is its ability to show the linkages or indirect effects between firms. These effects for one urban area, as compared to a whole nation or a large region are relatively unimportant.<sup>2</sup> This would seem to imply that knowledge of the consumption function multiplier effect is considerably more vital for changes in income than are the indirect effects which are so significant on the production side of the economy. Any small error

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<sup>2</sup> Charles M. Tiebout, "Input-Output and Foreign Trade Multiplier Models in Urban Research", Journal of the American Institute of Planners, XXIII (Summer 1957), 130.





in calculating the size of the household coefficient used in an input-output table may lead to a large error in the final outcome because households are such an important component of the whole system. This indicates how essential a knowledge of the local consumption-function is.

Another advantage of the economic base is that it is a measure of economic well-being which is something that input-output ignores. Expressing values in terms of income leads to meaningful accounts such as gross urban income, disposable income, etc. Input-output merely conveys information about the gross outlays of an urban unit.

The input-output approach which has been employed in urban and regional analysis, despite its statistical extensiveness, has frequently yielded misleading results because of its static nature and the fact that it uses a linear homogenous production function. These rigidities have reduced the effectiveness of the use of such exhaustive amounts of data and leads one to doubt the real usefulness of this tool of analysis for explaining urban growth problems and to see some of the merits of the economic base concept. Input-output, of course, is still in the stages of development as far as a dynamic approach is concerned, and may eventually be able to improve its relative position.

Linear programming approaches the growth problem as one of maximizing some desirable objective such as urban income, new employment opportunities, or the capital-output ratio subject to the relevant



constraints. In terms of emphasis on the welfare of the economy, it is a better tool of growth than input-output because it may be oriented to deal with the income accruing to an area. But like input-output, it puts most of the emphasis on the production processes and insists on linear homogenous production functions. It too requires tremendous amounts of data. Overall, it may be superior to input-output, but in its present state would not seem much better than the economic base technique when it comes to estimating urban growth. Whatever improvement in results might arise from use of this approach would not be likely to justify the extra expense of attaining those results so that the simpler, less precise approach may be preferable.

The conclusion to be drawn from the comparison of our economic base formulation with this summary of input-output and linear programming techniques is that the former may well provide the superior analytical tool. It was on the basis of unjustified criticisms that the economic base was discarded in favor of these others. In view of the total approach we advocate, however, at the very least a reassessment of the economic base is essential.



## CHAPTER IX

### CONCLUDING COMMENTS

The objective of this paper has been to attempt to show the economic theory that is imbedded in and consistent with the concept of the economic base. The reason for undertaking this project was primarily because this concept has been heavily criticised by economists without being adequately investigated by its critics. It contains certain valuable features which other approaches to the growth problem ignore and these needed to be exposed. The study is based almost entirely on theory because it is an attempt to move through a series of stages of developing a more meaningful economic base technique and empirical analysis at any one of these levels, much less at a number of them, would have been so extensive that the trend of developing the sophisticated approach would be lost.

Initially, the analysis reviews the literature of the economic base concept in its simplest form. This is done to establish a background on which a more complete tool of analysis for projecting urban growth can be constructed. The first major step in this direction is the transfer from employment to income as the unit of measurement. This enables us to incorporate a more elegant multiplier effect based on the propensities to consume and invest. Through an elaboration of the national income accounting procedure adapted to urban areas, it is





obvious that more than just the income from exports might promote a change in total income accruing to the community. Growth may also be influenced by non-resident investment and government expenditures and by resident investment and government expenditures. Yet export sales, having the largest dollar value except in rare circumstances, seems to have greater overall influence on growth than these.

The flow-of-funds accounting procedures show that there must be a consistent relationship between the net trade position of an urban area and the net flow of capital. Net importing communities receive a net inflow of capital from outside and thus grow relatively faster. This position can be reconciled with the economic base by realizing that, if excessive unemployment and excess capacity do not exist in the economy, then for any increase in export sales, there will be an almost simultaneous increased growth in the local demand for imported commodities. This leads to the important conclusion that growth of urban areas depends primarily on the excess of total investment over domestic saving, and that this extra investment is mostly the result of a capital inflow.

Pursuing further the investigation of investment, an attempt is made to estimate the consistency of the economic base concept with conventional economic growth models by examining the Domar model and a neoclassical approach. The problem of the comparative statics nature of the former as opposed to the dynamic nature of the latter is reconciled by considering the growth process to exist at two levels.



The former is concerned with the initial growth stimulus, and with the eventual result. The dynamic process is concerned with explaining how, given a certain stimulus, certain parameters and variables may yield the observed final result. It is shown that considerations of such concepts as the capital-output ratio and the marginal efficiency of capital yield results that are consistent with the conclusions of the economic base approach. As a matter of additional interest, the extent of the applicability of one of these, the capital-output ratio, as a growth indicator is briefly examined on the basis of Canadian experience. The results indicate a high measure of consistency between this approach and that of the simple base technique.

In my opinion it would be theoretically unacceptable to attempt to combine the concepts of the capital-output ratio and the marginal efficiency of capital directly with the income approach to the economic base in a single model because they are, as we have indicated, talking about growth at different levels. In addition, they initially refer to growth of different kinds (population as opposed to per capita income) although for the purposes of comparison relevant to this study, these can be reconciled.

The conclusions to be drawn from this thesis are few because of the lack of empirical work. It has mainly tried to shed some light on the economic theory related to the concept of the economic base. The model is basically very simple, but to increase the potential accuracy of prediction, variables must be considered which are difficult to



obtain from the real world. The theory of the more sophisticated model is solid but rarely have attempts been made to use it. Its popularity as a technique of planning waned with the rise of input-output and linear programming which occurred before the development of the sophisticated income approach, and it has not regained the favor of urban planners.

Yet the term "economic base" remains common in the writings and discussions of urban economists and planners as a catchword for how growth occurs. The same planners and economists, however, overlook the economic base technique in their practical studies of urban growth. It is hoped that through the suggestions of this thesis some confidence in the worth of the economic base concept as a planning tool is revived.







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